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FOR

GARDENERS AND BOTANISTS.

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BOTANICAL
GARDEN.

EDITED BY

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ASSISTED BY PROFESSOR J. W. H. TRAIL, A.M., M.D., F.L.S., IN THE PARTS RELATING TO INSECTS AND FUNGI; AND J. GARRETT IN THE FRUIT, VEGETABLE, AND GENERAL GARDEN WORK PORTIONS.

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REFERENCE TO ILLUSTRATIONS OF PLANTS OTHER THAN THOSE FIGURED IN THIS WORK.

IT has been suggested, by an eminent Authority, that many readers would be glad to be informed where reliable Illustrations could be found of those Plants which are not figured in this Work. To meet this want, references to the figures in Standard Authorities have been given, the titles of the Works referred to being, for economy of space, abbreviated as follows:

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Odontoglossum—*continued.*

O. hastilabium (halbert-lipped).* *fl.* large, 1½in. across, very fragrant, and numerous; sepals and petals soft creamy-white, beautifully streaked with transverse lines of whitish-brown; lip somewhat spear-shaped, white, with a dark rose base; spike 2ft., 3ft., or more high, much branched, and many-flowered. Summer. Pseudo-bulbs thick, pale green, fluted, with rather dark broad leaves. New Grenada, 1843. A strong-growing, handsome species. (B. M. 4272; B. O. 7.)

O. h. fuscatum (brownish). A synonym of *O. cariniferum.*

O. histrionicum (histrionic). A synonym of *O. luteo-purpureum mulus.*

O. Holfordianum (Holford's). A synonym of *O. luteo-purpureum mulus.*

O. Horsmani (Horsman's). *fl.* light sulphur-colour, with a few cinnamon blotches on the sepals; lip broad, wedge-shaped at base, with obscure teeth at the rounded outer border. New Grenada, 1880.

O. hystrix (bristly). A synonym of *O. luteo-purpureum.*

O. Insleayi (Insleay's).*† *fl.* from 2in. to 4in. in diameter; sepals and petals yellow, or yellowish-green, transversely banded with dull reddish-brown, narrow; lip narrow, somewhat spoon-shaped, bright yellow, dotted near the margin with cinnamon; scape tall, branched, bearing from five to ten blossoms. Winter. Mexico, 1840. This greatly resembles *O. grande* in habit, but its pseudo-bulbs are more compressed, longer, and fluted. SYN. *O. Lawrenceanum*, of gardens. (B. O. 4.)

O. I. leopardinum (leopard-spotted). *fl.*, sepals and petals deep yellow, barred across with bands of reddish-crimson; lip beautifully bordered all around with spots and dots of the same dark colour. Mexico, 1876. A very beautiful variety, richer in its markings than the type. (R. G. 856.)

O. I. pantherinum (panther-spotted). *fl.*, sepals and petals chestnut-brown, with paler margin; the whole of the lip arabesqued with red and yellow. A fine variety.

O. I. splendens (shining). *fl.*, sepals and petals rich shining brown, tipped with yellow; lip large, yellow, spotted with purple. Mexico, 1868. A very fine form.

O. Josephinæ (Josephine's). A synonym of *O. crispum Andersonianum.*

O. Karwinskii (Karwinski's). A synonym of *O. læve.*

O. Kegeljani (Kegeljan's). *fl.* arranged in a close raceme; sepals and petals yellow, elliptic-lanceolate, acute, the former incurved and marked with two or three red-brown blotches; lip oblong, cuspidate, concave, with serrulated margins, the base, apex, and margins white, and the rest reddish-brown. Peru, 1878. Nearly related to *O. triumphans.* (B. H. 1877, 10.)

O. Krameri (Kramer's).† *fl.* of a very pretty violet colour, the lip marked and spotted with yellow and purple, and having two lines of rich dark brown near the column; sepals and petals ligulate, obtuse; lip somewhat reniform, and deeply notched in front; peduncles drooping, freely produced, and usually three-flowered. Pseudo-bulbs somewhat flat, with sharp edges, sometimes almost spherical, at others ovate, pale green, and bearing but one leaf. Costa Rica, Mexico, 1868. A very pretty, but rare, species. (B. M. 5778; B. O. 24; F. M. 1868, 406; I. H. 562; W. O. A. i. 40.)

O. K. Smithianum (Smith's). *fl.* ivory-white, having a sulphur-coloured, reddish-spotted callus on the lip, and an orange transverse line, resembling two crescents, in front of it.

O. læve (smooth).* *fl.* very fragrant when first expanded, 2in. to 2½in. across, numerous, in slightly-branched racemes; sepals and petals cinnamon-brown, banded with yellow, the dorsal sepal and petals ascending, the lateral sepals deflexed; lip white and violet, smaller and shorter than the sepals, sessile, fiddle-shaped. *l.* 6in. to 10in. long, oblong-lanceolate, acute. Pseudo-bulbs 3in. to 4in. long, 2in. to 2½in. broad. Guatemala, 1841. (B. M. 6265; B. O. 16; B. R. 1844; I. H. 1859, 213.) SYNS. *O. Karwinskii*, *O. Reichenheimii* (B. O. 15).

O. Lawrenceanum (Lawrence's), of gardens. A synonym of *O. Insleayi.*

O. lepidum (elegant). *fl.*, sepals and petals at first yellow, afterwards changing to white, with yellow edging, the former with two or three brown spots, the latter with only one; lip cuneate-hastate at base, with a long central claw and a reniform, apiculate, front lobe, a brown spot in front of the keels; panicles short, many-flowered. Pseudo-bulbs round, rather flat. Columbia, 1884.

O. Lindenii (Linden's).* *fl.* yellow; sepals and petals unguiculate, lanceolate, undulated, acute; lip ovate-lanceolate; crest fleshy, glabrous, having four irregular flaps placed below the finger-like processes of its extremity; scape 2ft. to 3ft. high, with uniform lateral arms for more than half its length, each arm bearing from five to seven flowers. *l.* nearly 1ft. long, erect, ensiform. New Grenada, 1852. SYN. *O. platyodon.* (F. M. n. s. 333.)

O. Lindleyanum (Lindley's). *fl.* yellow, disposed in racemes; lip white, curiously lobed. *l.* lanceolate. Pseudo-bulbs flattened. New Grenada, 1865. (B. O. 11.)

O. L. Coradinei (Coradine's). *fl.* from 2in. to 3in. across; sepals and petals pale yellow, with two or three chestnut-brown blotches; lip creamy-white, with a large irregular blotch on its disk, and a few smaller spots near its base; spike few-flowered. (G. C. 1872, 1068; W. O. A. ii. 90.)

O. L. ligulare (strap-like). *fl.*, sepals and petals orange-yellow, with two or three large brown blotches; lip having an orange claw, and a hastate-ligulate, blunt, yellow blade, with a large brown blotch on its disk. 1882. A very handsome plant.

O. L. mirandum (extraordinary). This differs from the type in its stiff, one-sided raceme, well-developed, rhomboid, serrate column-wings, lanceolate leaves, and large, plump pseudo-bulbs. Columbia, 1882.

O. Londesboroughianum (Lord Londesborough's).* *fl.* light yellow, racemose; sepals and petals oblong, the latter crisped; lip transversely reniform, having on each side of its base a small, blunt, narrow, retrorse auricle; column yellow, wingless, bent. Mexico, 1876. SYN. *O. oncidioides.* (F. M. n. s. 246; W. O. A. ii. 82.)

O. Luddemannianum (Luddemann's). A synonym of *O. maculatum.*

O. luteo-purpureum (yellow-purple).* *fl.* about 2½in. across; sepals and petals lanceolate, acuminate, most frequently rich brown or purple, more or less blotched and banded with white or light yellow, and having a golden-yellow border; lip white, with a brown base, minutely serrate; scape longer than the leaves, many-flowered, simple or branched, and from 1ft. to 3ft. long. Winter and spring. *l.* oblanceolate, often of a bronzy colour. Pseudo-bulbs conical, slightly compressed, two-leaved. New Grenada. A species of robust habit, and extremely variable both in size of flowers and in the intensity of their markings; so much so, that hardly two specimens are alike. SYNS. *O. hystrix*, *O. lyroglossum*, *O. radiatum.* (B. O. 17.)

O. l.-p. amplissimum (very large). A fine variety, with very broad sepals and petals, of a clear light yellow, with a few brown streaks at the base, and a few large brown blotches on the disk. 1882.

O. l.-p. cuspidatum (cuspidate).* *fl.* yellow, tinted with rich chestnut-brown, and with a white lip, large; sepals and petals rather narrow, lanceolate, acuminate, spreading; lip ligulate, acuminate, wavy, and toothleted, with several split crests in front of the great square mark in the centre. Columbia, 1881. (R. X. O. 184, 1.)

O. l.-p. facetum (well-formed). *fl.*, sepals light yellow, with very large, rather cinnamon-coloured blotches, lanceolate, straight; petals lanceolate, straight, with numerous fine teeth, light yellow, covered with numerous small cinnamon-coloured blotches; lip almost circular, short, finely fringed, convolute, undulate, light yellow, having a radiating semicircle of keels; column with very multifid wings.

O. l.-p. mulus (mule).* *fl.* bright yellow, with cinnamon-brown spots. New Grenada, 1878. A very fine plant. SYNS. *O. histrionicum*, *O. Holfordianum.* (G. C. n. s., xix. 469; R. X. O. ii. 160.)

O. l.-p. sceptrum (sceptre). *fl.*, sepals larger than the petals, deep chocolate-brown, streaked and margined with yellow; petals irregularly lobed at the edges, golden, with two or three large chestnut-brown blotches; lip yellow, with serrated edge, dotted and blotched with chocolate. New Grenada, 1872. (I. H. 73.)

O. lyroglossum (lyrate-lipped). A synonym of *O. luteo-purpureum.*

O. maculatum (spotted).* *fl.* of a soft deep yellow, beautifully barred or spotted towards the centre with rich brownish-crimson, measuring 3in. to 4in. across; sepals lanceolate; petals much broader; lip cordate, large, spreading, yellow, spotted with brown; clusters pendent, consisting of about six blossoms. Spring. Pseudo-bulbs short, thick. Mexico, 1838. A lovely species, the habit of which is very similar to that of *O. cordatum.* SYNS. *O. anceps* (I. H. 128), *O. Luddemannianum* (R. G. 1859, 275). (B. M. 6455; B. O. 20; B. R. 1840, 30; W. O. A. ii. 52.)

O. m. polyodon (many-toothed). A synonym of *O. m. erosum.*

O. maculatum (spotted), of Hooker. A synonym of *O. cordatum.*

O. madrense (Sierra Madre). A synonym of *O. maxillare.*

O. marginellum (slightly margined). *fl.* light ochreous colour, spotted with brown; lip dark reddish-brown, with a yellow margin and yellow-tipped calli. 1883.

O. maxillare (jawbone).*† *fl.*, sepals and petals white, with a large purplish-brown blotch at the base; lip orange, margined with white, and having a brown spot in the centre. Summer. Pseudo-bulbs light green. Mexico, 1846. A very distinct and handsome species. SYN. *O. madrense* (I. H. 480; W. O. A. ii. 71). (B. M. 6144.)

O. maxillare (jawbone), of gardens. A synonym of *O. nebulosum.*

O. membranaceum (membranous). A synonym of *O. Cervantesii.*

O. Murrellianum (Murrell's). *fl.*, sepals and petals white, slightly tinged and spotted with purplish-violet. Columbia, 1875. A pretty natural hybrid.

O. M. cinctum (girded). *fl.* white, racemose; sepals and petals bordered with lilac; lip with some lilac spots on the front lobe, the base with a large yellow callus and some red spots. 1883. (R. G. 1101.)

Odontoglossum—*continued.*

O. nævium (speckled). *fl.* pure white, speckled and spotted with purplish-crimson; sepals and petals about 2in. long, lanceolate, beautifully crisped or waved; spike arching, 1ft. to 1½ft. long, and from ten to sixteen-flowered. May and June. *l.* oblong, narrow. Pseudo-bulbs oblong, flattened, deep green. New Grenada, 1842. A beautiful species. (B. O. 9; L. & P. F. G. i. 18; R. G. 791.)

O. nebulosum (clouded).† *fl.* white, more or less spotted with brown, 2in. to 4in. across; sepals and petals 1½in. to 2in. long, 1in. to 1¼in. broad, oblong, slightly incurved; lip cordate, with a lemon-yellow, bilobed crest, and a few brown spots; spikes stout, five to seven-flowered. March to May. Pseudo-bulbs roundish, two-leaved. Mexico. SYN. *O. maxillare*, of gardens (I. H. 1859, 200). The figures and descriptions of *O. maxillare* and *O. læve* are, in the work last named, curiously out of place; the description of *O. maxillare* is opposite the plate of *O. læve*, and that of *O. læve* is opposite figure of *O. maxillare*. (B. O. 1; G. C. 1867, 572.)

O. n. candidissimum (very white). A variety with entirely white flowers. 1884.

O. n. candidum (white). A free-growing form, having the flowers pure white, with the exception of the yellow crest and a few brown spots on the lip. 1867.

O. n. guttatum (spotted). A fine variety, having the basal half of the sepals and petals, and the greater part of the lip, spotted with reddish-brown. 1884.

O. n. pardinum (panther-like). A desirable form, having the flowers more densely spotted or blotched with brown. Columbia, 1873.

O. n. Pattisonianum (Pattison's). *fl.* snow-white, large, with a yellow callosity on the lip.

O. nevadense (Sierra Nevada). *fl.* chocolate-brown, margined and tipped with yellow, and streaked with the same colour, large; lip white; middle lobe cordate, and slightly serrate at the edge, side lobes spotted with brown inside; disposed on long spikes. Pseudo-bulbs dark green, bearing leaves which are narrow at the base. Columbia, 1871. A very rare species, distinguished by the singular crescent shape of the base of the lip in front of the stalk. (I. H. ser. iii. 45; W. O. A. iii. 131.)

O. nobile (noble). A synonym of *O. Pescatorei.*

O. odoratum (sweet-scented).* *fl.* yellow, spotted and blotched with chocolate-brown, very fragrant, 1½in. to 2in. across; sepals and petals lanceolate-acuminate, with undulated edges; lip lanceolate-trilobed, white, with a purple base; scape erect, branched, many-flowered. Winter and spring. Pseudo-bulbs ovoid, two-leaved. Sierra Nevada. A rare species. SYN. *O. gloriosum* (B. O. 12). (B. M. 6502.)

O. o. baphicantum (dyer's). *fl.* yellow, with purple blotches finely suffused over the whole of the sepals, petals, and lip; lip pandurate, cuspidate, serrate; column with an apiculate, serrate, cuspidate wing. Columbia, 1876.

O. o. deltoglossum (deltoid-lipped). *fl.* sulphur-coloured, with brown blotches and smears; sepals and petals spreading, lanceolate, acuminate, undulate; lip deltoid, with very short margin, lobed, wavy, toothleted, sulphur, with an orange base, little brown stripes on each side of the base, and a much larger brown obcordate blotch on the disk; column slender, with single tendril-like wings, whitish-yellow, with brown in front; raceme slender.

O. o. hebraicum (Hebrew-marked). *fl.* pale yellow, with brown spots and irregular stripes, twice as large as those of typical *O. odoratum*; lip darker yellow at base, with a cordiform, maroon-brown central blotch, and some spots and stripes of the same colour; callus bifid, with an erect apiculus in sinus, and four teeth on each side. 1879. (W. O. A. ii. 85.) The sub-variety *lineoligerum* has the letter-like markings broken up into spots and lines. (W. O. A. v. 84.)

O. o. latimaculatum (broad-spotted). A distinct variety, having deep golden flowers, which are very heavily blotched with bright crimson-brown. Columbia, 1871. (I. H. 1870, 39.)

O. o. Leeanum (Lee's).* *fl.*, sepals and petals bright yellow, with numerous brown spots, lanceolate, acuminate; lip long and narrow, bright yellow, with a paler disk and a few brown spots. 1882.

O. Oërstedii (Oërsted's).* *fl.* white, solitary, or in twos, the callus of the lip and the disk before the column yellow, with a few red spots; the column has very small, triangular, blunt auricles at each side of the base of the stigmatic cavity. Pseudo-bulbs roundish, two-edged, clothed with brown spathes, growing in dense masses, and having each a single, oblong, stalked leaf. Costa Rica, 1877. (B. M. 6820; Gn. xxvi. 454.)

O. oncidioides (Oncidium-like). A synonym of *O. Londesboroughianum.*

O. pardinum (panther-spotted).† *fl.* pure golden-yellow, with numerous brown blotches, disposed in wide panicles. December. *l.* elliptic-oblong. Pseudo-bulbs ovate-compressed. Peru, 1867. (B. M. 5993.)

O. pendulum (pendulous). A synonym of *O. citrosmum.*

Odontoglossum—*continued.*

O. Pescatorei (Pescatore's).* *fl.*, sepals and petals usually snow-white; lip panduriform, white, blotched at the base with purplish-crimson and yellow; spikes, or panicles, 1ft. to 2ft. long, erect or drooping, bearing from ten to 100 flowers. Spring. *l.* 6in. to 12in. long. Pseudo-bulbs thick, speckled with brown, two-leaved. New Grenada, 1851. A very lovely species, and one of the best of the genus. SYN. *O. nobile.* (B. O. 5; F. d. S. xvi. 24; Gn. xxvi. 452; R. G. 835; W. O. A. ii. 168.) Other forms than those enumerated have been called *aurantiacum*, *flaveolum*, *purpuratum*, in reference to the colour of the flower or parts of it.

O. P. excellens (excelling). *fl.*, sepals yellow, blotched with purple, the odd one with a white central area; petals broader, white, with yellow margins; lip pandurate, white, with yellow crests and purple blotches. 1882. (Gn. xxi. 330.)

O. P. Veitchianum (Veitch's). A handsome variety, with broad mauve zonal bands and blotches, two on each sepal and petal. With this may be grouped *elegans*, *Lawrenceanum* (Hort.), *limbosum*, *Lowianum*, *Schræderianum*, and *Thomsonianum*, all differing more or less from it in the form and extent of the blotches on the floral segments.

O. Phalænopsis (Phalænopsis). A synonym of *Miltonia Phalænopsis.*

O. platyodon (broad-toothed). A synonym of *O. Lindenii.*

O. polyxanthum (very yellow flowered). *fl.* 3in. to 4in. in diameter; sepals and petals yellow, blotched with chocolate; lip roundish, cuspidate, yellow at base, brownish-purple in front, and whitish-edged; spike 2ft. long. Ecuador (at 8000ft. altitude), 1881. (F. M. n. s. 453; G. C. xvi. 461, xix. 761.)

FIG. 717. ODONTOGLOSSUM ROSSII, showing Habit and detached Single Flower.

O. prænitens (shining forth). *fl.* bright golden-yellow, blotched with brownish-purple, lax, 2in. in diameter; sepals and petals nearly equal, elliptic-lanceolate, acuminate, rather waved; scape six to eight-flowered. *l.* 6in. to 8in. long, recurved, narrow, linear-oblanceolate. Pseudo-bulbs 2in. long, narrowly oblong, slender, much flattened. Columbia, 1874. (B. M. 6229.) Most of the plants in cultivation under the name of *O. prænitens* are referable to *O. facetum*, of Reichenbach.

O. præstans (distinguished). *fl.* yellowish, panicled; upper half of the linear-lanceolate sepals and petals maroon-brown; lip trifid, the basal lobes ciliated, and the four crests of the disk toothed, the inner ones aristate. *l.* linear-lanceolate, acute. New Grenada, 1875. Allied to *O. odoratum.*

O. pulchellum (pretty).*† *fl.* of a crystalline whiteness, very fragrant, about 1in. across; lip white, curiously bent or twisted, having a crest shaped like a W, of a clear lemon-yellow, with a few purple dots; spikes erect, about 1ft. high, and from ten to twelve-flowered. Spring. *l.* in pairs, dark green, very narrow. Pseudo-bulbs dark green, ovoid. Mexico, 1841. (B. M. 4104; B. R. 1841, 48.)

O. p. majus (greater).* A very robust form, having the pseudo-bulbs much larger, and the flowers fully double the size of the typical species. A most desirable plant.

O. purum (pure). A synonym of *O. Wallisii.*

O. radiatum (rayed). A synonym of *O. luteo-purpureum.*

O. ramosissimum (much-branched). *fl.* white, all parts being spotted, in different varieties, with deep violet, purple, or lilac; panicles large, much branched. *l.* long, linear-ligulate. Pseudo-bulbs oval, compressed. Venezuela, 1875. A showy orchid.

Odontoglossum—*continued.*

O. r. xanthinum (yellow). *fl.* yellow; sepals and petals twisted, streaked and spotted with mauve-purple; callus of lip ochre, with mauve-purple radiating rays around and before it. Columbia, 1880. A pretty variety.

O. Reichenheimii (Reichenheim's). A synonym of *O. læve.*

O. Roezlii (Roezl's). A synonym of *Miltonia Roezlii.*

O. Rossii (Ross').* *fl.* from 1in. to 2in. across; sepals lanceolate, about 1in. long, white, transversely barred with brown; petals sub-hastate, much broader than the sepals, pure white, with a few spots at their bases only; lip oblong or cordate, pure white, with a lemon-yellow, bilobed crest; column white; scapes from two to five-flowered. Winter. Pseudo-bulbs angular. Mexico, 1839. SYN. *O. acuminatum.* See Fig. 717. (B. R. 1839, 48; F. d. S. 2110; Gn. xxviii. 507.)

O. R. aspersum (sprinkled).† *fl.*, sepals whitish-yellow, mottled with brown blotches, keeled on the back; petals broader, whitish-yellow, with a few brown spots at the base; lip whitish, the basal callus yellow, with brown lines; bracts short and broad. 1879.

O. R. Ehrenbergii (Ehrenberg's).*† *fl.*, sepals pure white, narrow; petals white, barred with brown at base; lip white. Autumn and winter. Pseudo-bulbs and leaves small, dark green. Peru, 1842. A very pretty little variety, which may be grown in a rustic basket, suspended from the roof of a Wardian case. (F. d. S. 846; I. H. i. 30.)

O. R. Humeanum (Hume's). *fl.*, sepals yellow at their ends, with cinnamon bars, triangular-acuminate; petals oblong-acuminate, crisped, white, with three sepia-brown blotches at their base; lip two-lobed, white, with a yellow callus, striped inside with red; peduncle two-flowered. 1876.

O. R. musaicum (mosaic). A very handsome form, the violet petals having their lower halves covered by a large and beautiful blotch, green and yellow, and the lobes streaked and dotted.

O. R. rubescens (ruddy). A grand variety, with large, light, rose-coloured flowers, richly marbled with dark purple, turning to chestnut-brown. 1881.

O. R. Warnerianum (Warner's).* *fl.*, sepals and petals pure white, with a few brown spots; lip white, shaded with rose, and having a yellow blotch at the base; scape longer than the leaves, four or five-flowered. Autumn and winter. *l.* one on each pseudo-bulb, less than 9in. long, membranous, sharp-pointed, narrowed at the base into a channelled petiole. Mexico, 1865. A very handsome, dwarf species. (B. O. 13; G. C. 1865, 579.)

O. Schillerianum (Schiller's).* *fl.*, sepals and petals yellow, blotched with brown, or sometimes nearly all brown, cuneate-oblong, acute; lip with small, upright basal lobes, and an oblong-acute, wavy, velvety front lobe, yellow, with a purple blotch and two blunt calli on the disk. 1884. A fine species. (R. X. O. i. 22.)

O. Schlieperianum (Schlieper's). *fl.* pale yellow, blotched and barred with a deeper shade of the same colour, or almost destitute of spots; scapes erect, many-flowered. Autumn. New Grenada, 1856. This species very closely resembles *O. grande* in habit and growth. (F. M. 461; G. C. 1865, 1082; R. G. 605; R. X. O. ii. 143.)

O. Schrœderianum (Schrœder's). *fl.*, sepals and petals white, with mauve-purple blotches, oblong, acute, wavy; lip pandurate, white, with two mauve-purple blotches on the disk; callus having a plate of radiating spines on each side, yellow, with red spots. 1882. A distinct hybrid, in the way of *O. tripudians.*

O. stellatum (starry-flowered). *fl.* pale yellow, barred with brown; sepals and petals about 1in. long; lip white, somewhat concave, very much jagged round the margin; scapes about 4in. high, one-flowered. June. Pseudo-bulb 2in. to 3in. long, one-leaved. Mexico, 1839. A pretty, but not very showy, species. (B. O. 13.)

O. tentaculum (tentacled). *fl.*, sepals and petals yellow, spotted with white, narrow, without angles; lip whitish, with a large brown spot on the disk, and some small ones at the base, pandurate-lanceolate, acute. 1883.

O. tetraplasium (four-formed). *fl.* white, with purplish spots, growing on diffuse panicles, and equalling in size those of good forms of *O. odoratum.* Peru, 1875. Allied to *O. Weirii.*

O. tripudians (dancing).* *fl.* 2in. in diameter, brown, with yellowish-green edges and a few dots; sepals and petals nearly equal, lanceolate; lip oblong, acuminate, with a white basilar disk; the region about the calli of a beautiful purplish-violet; column whitish, with purplish-brown wings. Columbia, 1871. (B. M. 6029; F. M. m. s. 208.)

O. t. cinctum (girded). *fl.*, sepals and petals yellow, blotched with maroon; lip very broad, white, with a large brown blotch and smaller ones beside it. 1883.

O. t. Harryanum (Mr. Harry Veitch's). In this form, the sepals and petals are almost blackish inside, tipped with light yellow; the lip is light yellow, and mauve at the base. 1883.

O. t. oculatum (eyed). *fl.*, lip white, pandurate, crisped, marked with violet around the crest, and with a large brownish-violet blotch in front.

O. t. xanthoglossum (yellow-lipped). A variety with a totally yellow lip, mauve blotches, and the crests only pure white. 1881.

O. triumphans (triumphant).* *fl.* large and thick in substance, measuring upwards of 3in. in diameter; sepals and petals bright golden-yellow, blotched with deep brownish-crimson; lip cordate, the front portion deep warm rose-colour, and the basal half pure white, with a yellow centre; scape erect, many-flowered, branched. Spring. Pseudo-bulbs short, thick, speckled with brown, and bearing shining bright green leaves. Tropical America, 1867. A splendid species, of which there are several very desirable varieties. (B. O. 23; I. H. 609; W. O. A. 258.)

O. Uro-Skinneri (Ure Skinner's).* *fl.* light green or greenish-yellow, freckled with reddish-brown spots, 1½in. across; sepals and petals oblong; lip broad-cordate, white, thickly covered with soft blue spots, and sometimes tinged with red; spikes simple, 2ft. to 3ft. high, from ten to twenty-flowered. Latter part of summer and autumn. Pseudo-bulbs thick, bearing broad lanceolate leaves, 9in. to 12in. in length. Guatemala, 1854. A bold, free-growing species, very distinct in its colouring. It is closely allied to *O. bictonense*, but may be distinguished by the broad pseudo-bulbs, which become covered, in their second year, with a multitude of small reddish dots, its wide sepals and petals, and the spotting of the lip. (B. O. 2.)

O. velleum (fleecy). *fl.*, sepals and petals yellow, with brown streaks; lip whitish, with numerous violaceous stripes and blotches. *l.* about 6in. long. Pseudo-bulbs narrow, flat. Ecuador, 1874.

O. vexativum (provoking). *fl.*, sepals chestnut-brown, broad; petals broader, white, spotted with olive-green at the base; lip with a broad, semi-ovate blade, white, with a few olivaceous spots; callus yellow, with small red blotches; column white, wingless, tomentose; inflorescence large; bracts spathaceous. Mexico, 1877. A beautiful orchid.

O. vexillarium (standard). A synonym of *Miltonia vexillaria.*

O. Victor (Victor). *fl.*, sepals and petals yellow, with brown spots, spreading, wavy, and twisted; lip white, with brown blotches, pandurate, denticulate. 1883. This plant bears great similarity to *O. Hallii.*

O. Wallisii (Wallis'). *fl.* 2in. to 3in. across; sepals and petals oblong, about 1in. long, golden-yellow, blotched with rosy-purple; lip straw-coloured, with a rosy blotch near the apex, partially adnate to the column, and having the crest, margin, and apex white; spike erect or arching, five to ten-flowered. *l.* very narrow, grass-like, 9in. to 12in. long. Pseudo-bulbs ovoid, two-leaved. Columbia, 1870. SYN. *O. purum.* (I. H. n. s. 56.)

O. Weirii (Weir's). *fl.* white, marked with lilac or purple, disposed in diffuse panicles; lip wavy, oblong, acute, velvety on the surface. New Grenada, 1875.

O. Weltoni (Welton's). A synonym of *Miltonia Warscewiczii.*

O. Wilckeanum (Herr Wilcke's).* *fl.* of a very light whitish-yellow; sepals triangular, crisp; petals oblong, triangular, much broader, with some projecting angular laciniæ; both sepals and petals have elegant brown blotches, which are transverse in the former and marginal in the latter; lip similar to that of *O. crispum*, with three to five small tendril-like processes each side, and two ragged keels, which are free at their ends, including an intermediate apiculus, orange at the base, elsewhere lightest yellow, with some brown blotches; column pale whitish-yellow, with a few brown spots; peduncles bearing a raceme of about five flowers. 1878. A very handsome hybrid, just intermediate between *O. crispum* and *O. luteo-purpureum.* (G. C. n. s., xxi. 640.)

O. W. sulphureum (sulphur-coloured). *fl.* sulphur-coloured, having a few red blotches and lines on the lip, and one or two on the lateral sepals. 1884.

ODONTOLOMA. Included under **Davallia** (which *see*).

ODONTOSORIA. Included under *Davallia.*

ODONTOSPERMUM (from *odous, odontos*, a tooth, and *sperma*, a seed; the pappus of the seeds is toothed). SYNS. *Asteriscus, Nauplius.* ORD. *Compositæ.* A genus comprising about eight species of hardy or greenhouse, annual or perennial herbs, rarely shrubby, natives of the Mediterranean and Canary region, from the Orient to the Cape de Verde Islands. Flower-heads yellow, mediocre or rather large, heterogamous; involucre hemispherical or broadly campanulate; receptacle slightly convex; achenes villous or glabrescent. Leaves opposite, entire, or rarely toothed or sub-pinnatifid. The first of the undermentioned species requires similar treatment to that found necessary for common hardy annuals: sow the seeds in the open border, in spring, and thin

Odontospermum—*continued.*

out the seedlings somewhat, if too thick, to allow each plant to develop. *O. sericeum*, a handsome dwarf shrub, does well in a cool greenhouse, in a compost of well-drained turfy loam and leaf mould, and is propagated by cuttings of the half-ripened young shoots.

O. aquaticum (aquatic). *fl.-heads* sessile, axillary and terminal. July. *l.* oblong, obtuse, villous or slightly glabrous. Stem erect, di- or trichotomous. *h.* 6in. South Europe, 1731. Hardy annual. (S. F. G. 899, under name of *Buphthalmum aquaticum.*)

O. sericeum (silky). *fl.-heads* terminal and lateral, sessile. June. *l.* cuneate or linear, entire, silky-villous. Stem shrubby, branched. *h.* 4ft. Canaries, 1779. Greenhouse. (B. M. 1836, under name of *Buphthalmum sericeum.*)

ŒCEOCLADES. Included under **Saccolabium** (which *see*).

ŒCEOCLADES FALCATA. An old name of *Angræcum falcatum.*

ŒDEMONE. A synonym of **Herminiera** (which *see*).

ŒDERA (named in honour of George Œder, 1728-1794, Professor of Botany at Copenhagen). ORD. *Compositæ.* A small genus (four species) of greenhouse shrubs, confined to South Africa. Flower-heads yellow, brownish at back, heterogamous, sessile at the apices of the branches or between the uppermost leaves, solitary or few; receptacle small; achenes glabrous. Leaves opposite, clustered, imbricated, or squarrose, short, sessile, coriaceous, entire, often scabrous ciliated. The undermentioned species succeeds in sandy loam, with the admixture of a little peat. Propagation may be effected by cuttings, inserted in sandy soil, under a hand glass, in heat.

Œ. prolifera (proliferous). *fl.-heads* yellow; ray-florets dark purplish-maroon at back. May and June. *l.* lanceolate, opposite, ciliated, glabrous on both sides, reflexed. *h.* 1ft. 1789. (B. M. 1637.)

ŒNOCARPUS (from *oinos*, wine, and *karpos*, a fruit; some of the species yield palm wine and oil). ORD. *Palmeæ.* A genus, sometimes confused with *Euterpe*, comprising eight species of stove, South American palms, often unarmed and tall. Flowers monœcious, in Broom-like spikes, springing from beneath the leaves, and enveloped in double woody caducous spathes. Fruit often purple or black, oval or nearly round, with a granular, fibrous, oily flesh; one-seeded. Leaves in terminal crowns (in one species distichous), pinnate; segments narrow, or, rather, broad-ensiform, acuminate, rigid, and somewhat crisped; petioles short, and somewhat crisped. The species thrive best in a compost of peat and loam in equal parts. Propagated by seeds, or by suckers. The species here described are probably the only ones yet introduced.

Œ. Bacaba (Bacaba). *fl.*, calyx thrice as short as the corolla; laciniæ ovate-lanceolate; petals oblong, acute. Berry purplish-blue, sub-globose. *l.* sparse; pinnæ linear-lanceolate. Trunk naked, 50ft. to 60ft. high.

Œ. Bataua. Patana Palm. *fl.*, male calyx four times as short as the oblong and slightly acute petals. *fr.* cylindrical-elliptic, obtuse. *l.* dark green, pinnate, about 1½ft. long, not produced in great abundance. Stem naked. *h.* 40ft. 1820. An elegant species.

Œ. minor (lesser). *fl.*, male calyx four times as short as the petals; spathes woody, outer one narrow-lanceolate, inner usually cylindrical, 1ft. or more long; spadix fuscous, with branches 1ft. or more long. *fr.* blackish-purple, as large as a Hazel-nut, ovate-acute. *l.* scattered, six to ten, erecto-patent or horizontally spreading, 6ft. to 8ft. long; pinnæ 6ft. to 8ft. long, rather remote, the lower ones nearly alternate, the upper ones opposite and horizontally spreading, with a very long and acute mucrone. Trunk 10ft. or more high, naked, slender, flexuous.

ŒNOTHERA (from *oinos*, wine, and *thera*, a hunt or eager pursuit; an old Greek name given by Theophrastus to some plant, probably an Epilobium, the roots of which were eaten to provoke a relish for wine). Evening Primrose. Including *Godetia*, *Hartmannia* and *Sphærostigma.* ORD. *Onagrarieæ.* A genus comprising

Œnothera—*continued.*

about 100 species of herbs or small shrubs, of variable habit, natives of extra-tropical north and north-western South America, one being Tasmanian; a few of the American species are naturalised over the warmer regions of the globe. Flowers yellow, pink, or purple, usually large and showy, solitary, axillary, sessile, or peduncu-late; petals four, scarcely clawed, obovate or obcordate. Leaves membranous, sessile or petiolate, entire, dentate, lobed, or pinnatifid. All the undermentioned species are most desirable plants for summer and early autumnal flowering, and are of very easy culture in any rather sandy soil. Many of the species and varieties are amongst the most beautiful and attractive of hardy plants; their flowers are large, showy, and pleasingly fragrant. The plants are most suitable for the margins of shrubberies, mixed borders, and similar situations, preferably in warm, sunny positions. Propagation is easily effected by divisions in early spring; or by seed, sown in spring for flowering the same year, or in July for treating as biennials. Cuttings of the perennial species may also be inserted in pots, and placed in a cool frame, in the early part of the season, before flowering begins. Perennial, except where otherwise specified.

FIG. 718. ŒNOTHERA ACAULIS, showing Habit and detached Leaf and Flower.

Œ. acaulis (stemless).* *fl.* white, fading into red, large, with obovate, rather retuse, entire petals. May to September. *l.* rosulate, pinnatifid; the terminal lobe large and denticulated. *h.* 6in. Chili, 1821. See Fig. 718. (B. R. 763, under name of *Godetia acaulis.*)

Œ. albicaulis (white-stemmed). *fl.* white, becoming pinkish as they grow older, few, axillary; petals obcordate, large, as long as the tube. June. *l.* linear to oblong-lanceolate, sessile, or alternate at base, or abruptly petioled, entire, or repand-denticulate, or sinuate-pinnatifid towards the base. Stems decumbent. *h.* 6in. to 12in. California, &c. See Fig. 719 (1). SYN. *Œ. pallida* (B. R. 1142). (R. G. 1041.)

Œ. amœna (pleasing).* *fl.* rose, with four crimson spots. Summer. *l.* linear-lanceolate, entire. Stem ascending, diffuse, branched. *h.* 1ft. to 2ft. North-west America, 1826. Annual. (B. M. 2832, under name of *Œ. Lindleyi.*)

Œ. a. rubicunda (ruddy).* *fl.* lilac-purple, having a deep-coloured blotch at the base of each petal. *h.* 2ft. California, 1834. Plant erect. One of the best, and the parent of several varieties

Œnothera—*continued.*

FIG. 719. FLOWERING BRANCHLETS OF (1) ŒNOTHERA ALBICAULIS, AND (2) ŒNOTHERA CALIFORNICA.

including a handsome lilac and crimson-flowered form known as "The Bride." See Fig. 720. (B. R. 1856, under name of *Godetia rubicunda*.)

FIG. 720. FLOWERING BRANCH OF ŒNOTHERA AMŒNA RUBICUNDA.

Œ. anisoloba (unequal-lobed). *fl.* white, becoming red as they fade, large, with a very long tube; petals imbricated, with crenulated margins. May to October. *l.*, radical ones elliptic, entire or few-toothed; middle ones elliptic, sharply toothed, segments at base variable; upper ones unequal, pinnatifid. Stem suffruticose. *h.* 3ft. Chiloe, 1828. (B. R. 1479.)

Œnothera—*continued.*

Œ. biennis (biennial).* Common Evening Primrose. *fl.* pale yellow, large, delicately fragrant, with broadly obcordate petals. Summer and autumn. *l.*, radical ones oblong-lanceolate, cauline ones ovate-lanceolate, toothed, pubescent. Stem erect, branched. *h.* 2ft. to 4ft. North America. Biennial. One of the commonest species, of which the variety known as *grandiflora*, or *Lamarckiana* (see Fig. 721), has larger and finer flowers.

FIG. 721. PORTION OF INFLORESCENCE AND LEAF OF ŒNOTHERA BIENNIS LAMARCKIANA.

Œ. bifrons (two-faced). *fl.* yellow, large, handsome, sessile, solitary, axillary; petals roundish, much puckered. Autumn. *l.* alternate, nearly glabrous, semi-amplexicaul; lower ones ovate, acuminate; upper ones smaller. Stem nearly erect, green, often tinged with purple. *h.* 1½ft. Texas, 1835. Biennial. (B. M. 3764.)

Œ. bistorta Veitchiana (twisted-fruited, Veitch's).* *fl.* solitary in the axils of the leaves and bracts; petals full yellow, with small, deep, blood-coloured spots at base, spreading. Summer. *fr.* 1½in. to 2in. long, twisting with maturity. *l.* rather distant; lower ones shortly petiolate, lanceolate; upper ones broader and sessile. Stems simple or branched, sub-decumbent. South California. Annual. (B. M. 5078.)

Œ. cæspitosa (tufted). *fl.*, petals pinkish-white, large, profoundly obcordate. June. *l.* lanceolate, inciso-dentate. *h.* 1ft. North America, 1811. Plant almost stemless. (B. M. 1593.)

Œ. californica (Californian).* *fl.* varying from white to pale pink, with yellowish centre, 1½in. to 3in. in diameter, opening at night, very fragrant. July. Stems often 2ft. long, from an elongated, horizontal rootstock. A near ally of *Œ. albicaulis*. See Fig. 719 (2).

Œ. cardiophylla (heart-leaved). *fl.* yellow, funnel-shaped, disposed in loose terminal racemes; tube about 2in. long; limb 1in. across. *l.* cordate, toothed. Stems 1ft. high. California, 1883.

Œ. cheiranthifolia (Wallflower-leaved). *fl.* yellow, small, sessile. July. *l.* sessile, spathulate, obtuse, almost entire, villous. Stem much branched, ascendent, hirsute. *h.* 1ft. Chili, 1823. Annual. (B. R. 1040.)

Œ. eximia (choice).* *fl.* white, 4in. in diameter, with very long and slender calyx tubes. July. *l.* numerous, lanceolate, pubescent. Root fusiform. *h.* 9in. to 12in. Rocky Mountains of Upper California, 1870. A magnificent dwarf-growing species. See Fig. 722. (B. M. 5828, under name of *Œ. marginata*.)

Œ. fruticosa (shrubby). *fl.* deep yellow, large, with broadly obcordate, erose petals; racemes spicate, leafy, rather naked at base. June to September. *l.* ovate-lanceolate, denticulated. Stems erect, branched at the apex. *h.* 2ft. to 3ft. United States, 1737. (B. M. 332.)

Œ. f. ambigua (ambiguous). *fl.* rather pale yellow, at first corymbose, afterwards racemose, large for the size of the plant. July. (B. M. 3545.)

Œ. glauca (glaucous).* *fl.* pale yellow, large, with obcordate, erose petals. June to October. *l.* ovate, repandly toothed. *h.* 1ft. to 2ft. United States, 1812. Plant quite glabrous, decumbent, glaucous. (B. M. 1606.)

Œ. g. Fraseri (Fraser's).* *fl.* yellow, with obcordate petals, which are broad, and erosely undulated. June to October. *l.* ovate, glandularly denticulated. Stem simple at the base. *h.* 1ft. South Carolina, 1811. (B. M. 1674.)

Œ. grandiflora (large-flowered). *fl.* yellow; petals profoundly obcordate, distant, short. July. *l.* ovate-lanceolate, remotely toothed. *h.* 2ft. North America, 1778. Biennial. (B. M. 2068.)

Œnothera—*continued.*

Œ. Lindleyi (Lindley's). A synonym of *Œ. amœna.*

Œ. linearis (narrow).* *fl.* yellow, scarcely fragrant, corymbosely disposed on the tops of the branches. Summer. *l.* linear, or narrow-lanceolate, rather blunt, remotely toothed or entire, sometimes linear-oblong, tapering at the base, and slightly stalked. Stem slender, often branched. *h.* 10in. to 18in. United States.

FIG. 722. ŒNOTHERA EXIMIA, showing Habit and Longitudinal Section of detached Flower.

Œ. macrocarpa (large-fruited). A synonym of *Œ. missouriensis latifolia.*

Œ. marginata (margined). A synonym of *Œ. eximia.*

FIG. 723. FLOWERING BRANCH OF ŒNOTHERA MISSOURIENSIS LATIFOLIA.

Œ. missouriensis (Missouri). *fl.* yellow, large, with broadly obcordate petals; calyx spotted with red. June to August.

Œnothera—*continued.*

l. lanceolate, quite entire, or glandularly denticulated, with the margins and nerves covered with white silky down. Stem simple, prostrate, downy. United States, 1811. (B. M. 1592.)

Œ. m. latifolia (broad-leaved).* A fine form, with broader leaves than the type. See Fig. 723. (S. B. F. G. 5, under name of *Œ. macrocarpa.*)

Œ. odorata (fragrant). *fl.* at first yellow, becoming reddish as they fade, with deeply obcordate petals. April and May. *l.* lanceolate, a little toothed, undulately curled. Stems branched, suffruticose at the base. *h.* 1ft. to 2ft. Patagonia, 1790. Biennial.

Œ. o. virescens (greenish). *fl.* yellow; sepals unguiculate at back; petals obcordate, entire. June. *l.* linear-lanceolate, slightly toothed, undulately crisped. *h.* 2ft. South America, 1790. Biennial. (B. M. 2403, B. R. 147, and H. E. F. 183, under name of *Œ. odorata* β.)

Œ. odorata β (fragrant), of Sims. A synonym of *Œ. o. virescens.*

Œ. pallida (pale).* *fl.*, petals white, yellow at base, becoming reddish as they fade. June to September. *l.* linear-lanceolate, acuminated, quite entire or toothed, glabrous. Stems ascending, branched. *h.* 1½ft. North America, 1826. (B. R. 1142.)

Œ. pallida (pale), of Douglas. A synonym of *Œ. albicaulis.*

Œ. pumila (dwarf). *fl.* yellow, large. July. *l.* oblong-lanceolate, obtuse, sub-sessile, entire, yellow. Stem branched. *h.* 6in. North America, 1757. (B. M. 355.)

Œ. purpurea (purple). *fl.* purple; calyx tube short; petals broadly obovate, crenulate. June. *l.* lanceolate, attenuated at both ends. *h.* 1ft. North America, 1794. Annual. (B. M. 352.)

Œ. riparia (river-bank). *fl.* yellow, small, sub-spicate, on short pedicels, and with emarginate petals. Summer. *l.* lanceolate, denticulated. Stems erect, nearly glabrous. *h.* 2ft. to 3ft. North America.

Œ. Romanzovii (Romanzow's). *fl.* violaceous; petals broadly obovate, crenulate. Summer. *l.* lanceolate-oblong, mucronate, attenuated to the petioles. Stem erect, glaucous. *h.* 1ft. North America, 1817. (B. R. 562, under name of *Godetia Romanzovii.*)

Œ. rosea (rosy). *fl.* pink; petals somewhat round-obovate. June. *l.* ovate, attenuated at both ends, toothed; lower ones lyrate. *h.* 1ft. Mexico, &c., 1783. Half-hardy. (B. M. 347.)

FIG. 724. FLOWERING BRANCH OF ŒNOTHERA SPECIOSA.

Œ. speciosa (showy).* *fl.* white, becoming reddish as they fade, sub-racemose, with obcordate petals; raceme naked, at first drooping. March to September. *l.* oblong-lanceolate, attenuated at both ends, serrated and somewhat pinnatifid, pubescent beneath. Stem suffruticose. *h.* 2ft. to 3ft. North America, 1821. See Fig. 724.

Œnothera—*continued.*

Œ. taraxacifolia (Dandelion-leaved).* *fl.* white, becoming reddish as they fade, with large, obovate, entire petals, and a very long tube. Summer. *l.* pubescent, alternate, interruptedly pinnatifid, sinuately toothed, but the apex entire. Stem branched, elongated, procumbent. *h.* 6in. Chili, 1825. (S. B. F. G. 294.)

Œ. tenella (delicate). *fl.* purple. June. *l.* linear-spathulate. Stem branched, erect. *h.* 6in. to 9in. Chili, 1823. Plant rather glaucous. Annual. (B. M. 2424.) *G. tenuifolia* is very closely allied to this species.

Œ. triloba (three-lobed). *fl.* pale yellow, very fragrant in the evening; petals obovate, slightly three-lobed at the apex, the middle lobe mucronate. May to September. *l.* interruptedly pinnatifid, toothed. *h.* 3in. to 6in. North America, 1822. Annual. (B. M. 2566.)

Œ. vinosa (wine-stained). *fl.*, petals nearly white, with a slight dash of purple; calyx tube not more than one-third the length of the limb. July and August. *l.* linear-oblong, sub-dentate, glabrous. *h.* 2ft. California, 1835. Hardy annual. (B. R. 1880, under name of *Godetia vinosa*.)

Œ. Whitneyi (Whitney's).* *fl.* very numerous, crowded, 3in. to 4in. in diameter, rosy-red, blotched with crimson. Summer. *l.* oblong-lanceolate. *h.* 1ft. to 1½ft. California, 1870. Annual. SYN. *Godetia grandiflora* (B. R. 28, 61). (B. M. 5867.) There are several varieties of this fine species, including *concolor* (white), *flammea* (crimson), and *flammea striata* (crimson-striped).

Varieties. Of hardy annuals, few are more beautiful than than some of the garden varieties of *Œnothera*, which are much better known under the familiar name of *Godetia*. They are very attractive in mixed borders, especially if sown in masses, and are also most effective when grown in pots for greenhouse decoration. The following are amongst the best in cultivation:

Duchess of Albany. *fl.* of a beautiful satiny-white, sometimes 4in. across. Plant of pyramidal growth, very floriferous, and extra good.

FIG. 725. FLOWERING BRANCHES OF ŒNOTHERA LADY ALBEMARLE.

Lady Albemarle. *fl.* crimson, showy, and distinct. Plant dwarf and branching; very beautiful. See Fig. 725.

Lady Satin Rose. *fl.* beautiful rose. Habit similar to LADY ALBEMARLE. A brilliant-coloured and good variety.

Princess of Wales. *fl.* ruby-crimson. A good, rather old, variety, rather taller growing than either of the preceding.

The Bride. *fl.* white and carmine. Very free flowering and pretty.

ŒNOTHERÆ. A synonym of *Onagrariæ*.

OFFICINAL. Sold in shops.

OFFSETS. An Offset is a short, lateral shoot, bearing clustered leaves at the extremity, and capable of taking root when separated from the parent plant. The order *Crassulaceæ* affords several examples.

OFTIA (meaning unexplained by its author). SYN. *Spielmannia*. ORD. *Myoporineæ*. A genus comprising only a couple of species of greenhouse, evergreen shrubs, natives of South Africa. Flowers white, in the upper axils, sessile, or shortly pedicellate, ebracteate; calyx five-parted; corolla tube cylindrical; limb of five obovate, spreading lobes. Leaves alternate, or the lower ones opposite or almost whorled, sessile, serrulate, often rather small. The undermentioned species will thrive in any rich light soil. Young plants may be readily obtained by means of cuttings, inserted in sand, under a glass, in heat.

O. africana (African). *fl.* white, solitary, axillary; corolla salver-shaped, the segments marked with a blue streak at their base. February to November. *l.* ovate, acute, rigid, unequally serrate, with slightly pungent teeth; lower ones opposite; upper ones alternate. Branches succulent, opposite, rounded. *h.* 3ft. 1710. (B. M. 1899, under name of *Spielmannia africana*.)

OGECHEE LIME. *See* **Nyssa capitata.**

OHIGGINSIA. A synonym of **Hoffmannia** (which *see*).

OHLENDORFFIA (named in honour of Dr. C. F. Ohlendorff, of Holstein). SYN. *Chilostigma*, ORD. *Scrophularineæ*. A genus comprising nine species of small greenhouse shrubs, rarely herbs, depressed, prostrate or tufted, now regarded as a synonym of *Aptosimum*; one is a native of Nubia, and the rest are found in tropical Africa. Flowers sessile, axillary, bibracteolate; calyx deeply five-fid, with narrow, sub-valvate lobes; corolla usually bluish, venose, with an enlarged throat, and a spreading, oblique, five-fid limb; stamens four. Leaves alternate, clustered, entire, one-nerved, oblong-spathulate, linear, or acicular. *O. procumbens*, the only species known to cultivation, thrives in well-drained sandy peat. It is propagated by cuttings of half-ripened shoots, inserted in gentle heat; or by seeds.

O. procumbens (procumbent). *fl.* blue; corolla eight lines long, pubescent without, with a short narrow tube and a funnel-shaped limb. August. *l.* three to four lines long, not opposite, much crowded, petiolate, obovate, glabrous, rather thick, very obtuse, shortly mucronate. *h.* 2½ft. South Africa, 1836. Undershrub. (B. R. 1882, under name of *Aptosimum depressum*.)

OIDES. *See* **Odes.**

OIDIUM. A name given to many of the minute Fungi included under the name Mildew, at a time when they were regarded as distinct and good species, without regard to the forms which, it is now known, they assume when fully mature. *See* **Mildew.** In the *Oidium* stage, the Fungus consists of a white coating over all parts of the infested plants. Under the microscope, this is seen to consist of a tangled network of nearly transparent filaments, made up of cells joined end to end. Most of the filaments creep on the surface of leaves, or stems, of the host-plants, pushing fine-lobed branches into the cells of the latter, to suck food from them; while erect filaments stand up over the surface of the Fungus. Each filament is made up of a row of cells, and those at its tip, after a time, break off, and fall away from the lower part, as reproductive bodies (conidia); these in some Fungi are globular, in others barrel-shaped, or nearly cylindrical. But many of the Fungi formerly placed in the group called *Oidium*, when traced to their full development, are found to form reproductive bodies (spores) in asci, which are inclosed in a case, or perithecium, formed of brown cells, closely joined side by side. Frequently, many perithecia are formed on a patch of the Fungus resembling grains of

Oidium—*continued.*

gunpowder strewn over the white or pale grey surface. The perithecia usually bear, on their outer surface, simple or forked hairs or prickles, the differences in which help in distinguishing the species and genera of the group. The number of asci in each perithecium, and the number of spores in each ascus, differ considerably in the various genera. There are many different kinds of *Oidium*, but all have a characteristic appearance, that enables an expert to recognise a member of the group, on seeing the affected plant. Several of the species are met with on uncultivated plants, others on cultivated ones; frequently, they injure the latter very much, *e.g.*, *Erysiphe graminis*, on grass-leaves, as whitish spots on leaves and stems of grasses; *E. Martii*, on Peas; and so forth. In some species, *e.g.*, *E. graminis*, the perithecia are formed only under very favourable circumstances; hence they are much better known as *Oidium* than in the perfect state. This leads to a few species, the *Oidium* of which is, at times, very plentiful and harmful, while their perithecia remain unknown. In this latter group may be noticed that found on Turnips, in various parts of England, and also in Scotland, caused by an *Oidium* (*O. Balsamii*); and the widely-known disease of the Grape Vine, characterised by the formation of white patches on leaves and Grapes, these patches belonging to a Fungus only too famous as *Oidium Tuckeri*.

The various *Oidia* prove hurtful by absorbing the protoplasm from the cells of their hosts, by means of the small lobed branchlets pushed into the tissues of the latter. The result of this is to cause the parts attacked to become yellow and faded, and, after a time, death of the part, or of the whole plant, ensues. The Vines in many Vine-producing countries were exceedingly injured by *O. Tuckeri*; the Hops in England, and elsewhere, are often seriously damaged by *Sphærotheca Castagnei*; and many other plants suffer, in greater or less degree, from attacks of other species of this group.

Remedy. The superficial position of the Fungi renders direct treatment easy. A thorough application to the diseased parts of the host-plants of flowers of sulphur, or of potassium sulphide in weak solution, is found sufficient to put an end to the growth of the Fungus, without injuring the host. The solution has been recently found most useful in the removal of Green Fly and Red Spider, as well as of Mildew.

OIL NUT. A West Indian name for the seeds of *Ricinus communis*.

OIL PALM. *See* **Elaëis.**

OLACINEÆ. An order of erect, climbing, or twining shrubs or trees, very rarely suffruticose or sub-herbaceous, dispersed over the tropical and sub-tropical regions of the globe, a few growing in South Africa or extra-tropical Australia. Flowers greenish, yellowish, or white, rarely purplish, generally small; calyx four or five (rarely six) toothed, lobed, or parted; petals four, five, or rarely six, free, or coalescing in a campanulate or tubular corolla; inflorescence cymose, racemose, or paniculate. Fruit usually drupaceous, one-seeded. Leaves alternate, or rarely opposite, entire or occasionally toothed, often penninerved; petioles usually flexuous; stipules none. The order includes thirty-six genera and about 170 species. Examples: *Heisteria*, *Icacina*, and *Olax*.

OLAX (from *olax*, a furrow; flowers partially furrowed or imbricated). SYNS. *Fissilia*, *Lopadocalyx*, *Spermaxyrum*. ORD. *Olacineæ*. A genus of about twenty-two species of stove, often climbing, glabrous trees, shrubs, or sub-shrubs; eight are found in Australia, ten in tropical Asia, and four are indigenous to tropical Africa or Madagascar. Flowers small, disposed in short axillary spikes or racemes, rarely solitary. Leaves alternate, often distichous, entire, articulated with the branches. The undermentioned species, probably the only

Olax—*continued.*

ones known to cultivation, thrive in a compost of sandy peat, fibry loam, and a little dried leaf mould. Propagated by cuttings of ripened shoots, inserted in sand, under a bell glass, in heat.

O. imbricata (imbricated). *fl.* white; racemes axillary, imbricated. December. *fr.* ovate. *l.* oblong, or oblong-lanceolate, bifarious, entire, shining. East Indies, 1820. Climbing shrub.

O. scandens (climbing). *fl.* white, racemose; petals six. December. *l.* pubescent beneath. Stem prickly; branches terete, climbing. Coromandel, 1820. Shrub.

O. stricta (upright). *fl.* white, abortive. *l.* oblong-linear, mucronate. Australia, 1820. Erect glabrous shrub. SYN. *Spermaxyrum strictum*.

OLDENLANDIA (named after Henry Bernh. Oldenland, a Dane, who collected plants at the Cape of Good Hope). ORD. *Rubiaceæ*. An extensive genus (about seventy species) of stove or greenhouse, slender, erect or diffuse herbs, sometimes shrubby at base; they abound in tropical and sub-tropical regions, being mostly found in Asia. Flowers white or pink, small, in axillary or terminal panicles, or rarely solitary. Leaves opposite, narrow, frequently small. The species have no horticultural interest.

OLDFIELDIA (named after R. A. Oldfield, a merchant at Sierra Leone). ORD. *Euphorbiaceæ*. A monotypic genus, the species being a stove evergreen tree. It thrives in a mixture of loam, leaf mould, and sand, and requires an abundance of water when in rapid growth. Propagated by cuttings.

O. africana (African). *fl.*, males loosely cymulose, the small cymes axillary, on peduncles shorter than the petioles; female flowers unknown. *l.* opposite, long-stalked, digitately five to seven-foliolate; leaflets petiolulate, entire, coriaceous, penni-veined. Tropical Western Africa. The timber of this tree is believed to be the African oak or teak.

OLD MAN. A common name applied to *Artemisia Abrotanum* and *Rosmarinus officinalis*.

OLD MAN'S BEARD. *See* **Clematis Vitalba.**

OLEA (the old Latin name, akin to the Greek *Elaia*, the Olive). Olive. ORD. *Oleaceæ*. A rather large genus (about thirty-five species) of usually greenhouse evergreen trees, natives of tropical and central Asia, the Mediterranean region, tropical and South Africa, the Mascarene Islands, and New Zealand. Flowers white, in axillary and terminal panicles, small; corolla funnel-shaped, with a short tube; inflorescence mostly or almost totally centripetal. Drupe ovoid, oblong, or globose. Leaves opposite, entire or rarely toothed. The species here described are those best known to cultivation. Oleas thrive in well-drained loam, and are of the easiest cultivation. They are propagated by cuttings of the ripened young shoots, or by seeds.

O. capensis (Cape). *fl.* disposed in racemose terminal panicles, June. *fr.* rather wrinkled, size of a pea. *l.* oblong, coriaceous, dense and rigid, decussate, always paler beneath. Branches rather tetragonal, from decurrent lines. *h.* 5ft. Cape of Good Hope, 1730. (B. R. 613.)

O. europæa (European), Wild Olive. *fl.* panicled. June to August. *fr.* small, of no value. *l.* oblong, mucronate, quite entire, shorter and stiffer than those of the cultivated Olive, hoary beneath while young. Branches rather quadrangular, hoary. South Europe, &c., 1821. This small tree is nearly hardy. SYN. *O. Oleaster*.

O. e. sativa (cultivated). *fl.* small, panicled. August. *l.* lanceolate, mucronate, quite hoary beneath. Branches angular, but not spinescent. South Europe, 1570. SYN. *O. sativa*.

O. fragrans (fragrant). A synonym of *Osmanthus fragrans*.

O. ilicifolia (Holly-leaved). A synonym of *Osmanthus Aquifolium*.

O. laurifolia (Laurel-leaved). *fl.* disposed in terminal, loosely trichotomous panicles. Summer. *fr.* sub-globose. *l.* oblong, acuminate at both ends, more or less undulated, or flat, entire, glabrous, petiolate; petioles ½in. long. Cape of Good Hope. (B. M. 3089 and L. B. C. 379, under name of *O. undulata*.)

O. Oleaster (Oleaster). A synonym of *O. europæa*.

O. sativa (cultivated). A synonym of *O. europæa sativa*.

O. undulata (wavy). A synonym of *O. laurifolia*.

Olea—*continued.*

O. verrucosa (warted). *fl.* in axillary panicles, scarcely shorter than the leaves. April. *fr.* sub-globose. *l.* linear-lanceolate, sub-sessile, attenuated at both ends, callous-apiculate, entire, glabrous above, scaly beneath. Cape of Good Hope, 1814.

OLEACEÆ. An order of erect or climbing shrubs or trees, inhabiting the temperate and warmer regions of the globe. Flowers hermaphrodite, rarely dicœcious or polygamous, regular; calyx campanulate, four or many-toothed or lobed, rarely none; corolla gamopetalous, salver or funnel-shaped, or campanulate; lobes or petals four, rarely five or six, sometimes absent; inflorescence sometimes centrifugal, dichotomously cymose, sometimes trichotomously paniculate, mostly or totally centripetal, or the branchlets ultimately centrifugal-cymose; panicles, or cymes, loose, or in contracted fascicles, axillary or terminal. Fruit indehiscent, or a loculicidal capsule, a berry, or a drupe. Leaves opposite, rarely alternate or whorled, simple or pinnately three or few-foliolate, entire or toothed; stipules none. Olive oil is expressed from the pericarp of the drupe of *Olea europæa*, and the unripe drupe, macerated in brine, is eaten. Ash-wood (*Fraxinus*) is invaluable for its lightness, flexibility, and strength; and a sugary juice, Manna, is produced by *F. Ornus* and some other species; while the bark of the common Ash (*F. excelsior*) has been proposed as a substitute for quinine. The order contains eighteen genera and about 280 species. Illustrative genera are: *Fraxinus*, *Jasminum*, *Olea*, and *Syringa*.

OLEANDER. *See* **Nerium Oleander.**

OLEANDRA (from *Oleander*, which plant *O. neriiformis* is thought to resemble). ORD. *Filices.* A small genus (about half-a-dozen species) of stove ferns, almost restricted to the tropics. They are distinguished from *Nephrodium* mainly in habit, with wide-creeping, scandent shoots, jointed stems, and entire, lanceolate-elliptical fronds. Sori round, inserted in a row near the base, or below the centre of the compact, free veinlets; involucre reniform. The species in cultivation may be used for pillar plants. A wire cylinder should be made around the pillar, and filled up with fibrous peat and sphagnum. The creeping rhizomes should then be laid over the surface, and fastened by means of small wire or wooden pegs. Large pots or pans may also be utilised, on which to build fibry peat in the shape of a cone or ball, covering the surface with rhizomes in the same way. Thus treated, specimens of almost any size may be, in course of time, obtained. For general culture, *see* **Ferns.**

O. articulata (jointed).* *shoots* firm, sub-erect, wide-climbing, scaly. *sti.* scattered, sometimes opposite, but not whorled, 1in. to 2in. long, with the joint close to the base. *fronds* 6in. to 12in. long, 1½in. to 2in. broad. *sori* in two irregular rows, often some distance from the midrib. Natal, Mascarene Islands, &c. A fine, evergreen species.

O. hirtella (slightly hairy). A form of *O. neriiformis.*

O. musæfolia (Musa-leaved). *shoots* firm, wide-climbing, clothed with adpressed scales. *sti.* ½in. to 1in. long, jointed close to the base. *fronds* 6in. to 12in. long, 1in. to 1½in. broad, narrowed gradually towards both ends. *sori* in two irregular rows near the midrib; involucre oblique. Ceylon and Malayan Islands.

O. neriiformis (Oleander-like).* *shoots* woody, sub-erect, scaly. *sti.* ½in. to 1in. long, with the joint just below the middle. *fronds* 6in. to 18in. long, ¾in. to 1½in. broad, scattered or in opposite pairs, or often in terminal whorls, narrowed gradually towards both ends. *sori* in two rather irregular rows, near the midrib; involucre oblique. Tropics. A very handsome species, of which *O. hirtella* is merely a form.

O. nodosa (knotty).* *shoots* trailing horizontally, densely clothed with linear-subulate, spreading scales. *sti.* scattered, 2in. to 6in. long, often ebeneous, articulated not far from the base. *fronds* 6in. to 12in. long, 1½in. to 2½in. broad, the apex acuminate, the edge entire. *sori* scattered, placed nearly all in the inner half of the frond; involucre one-third of a line broad. West Indies, &c. A beautiful, free-growing species, distinguished from all the others by its trailing shoots, satiny gloss, and copious, irregularly-scattered sori.

Oleandra—*continued.*

O. Wallichii (Wallich's). *shoots* trailing horizontally; scales spreading, ferruginous. *sti.* close or scattered, ½in. to 2in. long, jointed close to the base. *fronds* 6in. to 12in. long, ¾in. to 1½in. broad, the apex acuminate; rachis naked or scaly. *sori* in single rows close to the midrib; involucre ciliated. North India (up to 7000ft. altitude).

OLEARIA (from *Olea*, an Olive-tree; in allusion to the resemblance to that tree existing in some of the species). SYN. *Eurybia.* ORD. *Compositæ.* A large genus of greenhouse or hardy shrubs, sometimes arborescent, sub-shrubs, or rarely branched herbs. Eighty-five species have been described; of these, sixty-three are Australian, and the rest natives of New Zealand and the adjacent islands. Flower-heads rather large, mediocre or small, solitary, corymbose or paniculate; ray-florets white or blue; disk yellow, or rarely bluish-purple; involucre ovoid, campanulate, or sub-hemispherical; receptacle flat or slightly convex, foveolate. Leaves alternate or rarely opposite, penniveined or one-nerved, entire or dentate. Olearias make excellent plants for the cool conservatory—where they thrive best when planted out—or for clothing dwarf walls, &c. Some of them—*O. Haastii*, for instance—make beautiful bushes in the open shrubbery border, and are quite hardy in most places. The species are readily propagated by means of half-ripened young shoots, inserted in sandy soil, under a bell glass, and shaded. They succeed in almost any soil. Probably the species here described are the only ones yet introduced.

O. dentata (toothed).* *fl.-heads* rosy-white, about 1¼in. in diameter, in terminal, erect or spreading corymbs. Spring. *l.* petioled, very variable, 1½in. to 2in. long, elliptic-ovate or cordate-ovate, obtuse, crenated. Australia. Nearly hardy shrub, with branches, leaves (beneath), and inflorescence densely tomentose. (B. M. 5973.)

O. Forsteri (Forster's). *fl.-heads* white, fascicled, and sessile on the branches of the panicle; corymbs longer than the leaves, many-headed. Summer. *l.* 2in. to 3in. long, oblong, obtuse; margins undulated; both surfaces reticulated, lower white with down; petioles ½in. to 1in. long. New Zealand, 1866. A small, hardy tree.

O. furfuracea (scurfy). *fl.-heads* ¼in. in diameter, numerous, in large, branched, loose, spreading corymbs. *l.* 1½in. to 2½in. broad, ovate-oblong, obtuse, waved, rarely sinuate-toothed, rounded and unequal at base, reticulated above; petioles ½in. to 1in. long. Branches terete, velvety. *h.* 10ft. to 15ft. New Zealand. Hardy tree.

FIG. 726. OLEARIA GUNNIANA, showing Flowering Branch; (1) Branchlet, and (2) Flower-head.

O. Gunniana (Gunn's).* *fl.-heads* white, borne in great profusion, about ¾in. in diameter. September. *l.* oblanceolate, coarsely toothed, and hoary on the under surface. Branches hoary. *h.* 3ft.

Olearia—*continued.*

to 5ft. Tasmania. A very handsome shrub; hardy if afforded some protection in winter. SYN. *Eurybia Gunniana*. See Fig. 726. (G. C. n. s., xvii. 733.)

O. Haastii (Haast's).* *fl.-heads* white, numerous, shortly pedicellate, in lax or dense, sub-terminal, corymbose, hoary cymes; peduncles usually much longer than the leaves. August. *l.* crowded, ¾in. to 1in. long, elliptic or ovate-oblong, obtuse or sub-acute, white beneath. Branches woody, thick, the ultimate ones hoary. New Zealand. Hardy shrub. (B. M. 6592.)

O. ramulosa (slightly-branched). *fl.-heads* whitish, small, very numerous, usually sessile, or terminating very short peduncles or branchlets. Autumn. *l.* crowded, usually very small and spreading, sometimes reflexed and clustered in the axils, one to six lines long. *h.* 3ft. to 6ft. Australia. A much-branched shrub.

OLEASTER. *See* **Elæagnus.**

OLERACEOUS. Esculent; suitable for culinary use.

OLFERSIA. Included under **Acrostichum** (which *see*).

OLIBANUM-TREE. *See* **Boswellia.**

OLIGOCARPHA. A synonym of *Brachylæna.*

OLIGOSCIAS. Included under **Panax** (which *see*).

OLIGOSMA. A synonym of **Nothoscordum** (which *see*).

OLIVACEOUS. Greenish-brown.

OLIVE. The original home of the Olive is, probably, Asia Minor and Greece, but it is now abundantly naturalised in many countries, notably in the Mediterranean region. "The Olive is one of the most characteristic and beautiful features of all Southern scenery. On the slopes of the Northern Apennines, Olives are the usual forest timber; the whole of the Val d'Arno is wooded with them, every one of its gardens is filled with them, and they grow, in orchard-like ranks, out of its fields of maize, or corn, or vine, so that it is physically impossible, in most parts of the neighbourhood of Florence, Pistoja, Lucca, or Pisa, to choose any site of landscape which shall not owe its leading character to the foliage of these trees. What the Elm and Oak are to England, the Olive is to Italy. . . . . And here I challenge the untravelled English reader to tell me what an Olive-tree is like? I know he cannot answer my challenge. . . . . Now, the main characteristics of an Olive, tree are these: It has sharp and slender leaves, of a greyish-green, nearly grey on the under surface, and resembling, but somewhat smaller than, those of our common Willow. Its fruit, when ripe, is black and lustrous; but, of course, so small that, unless in great quantity, it is not conspicuous on the tree. Its trunk and branches are particularly fantastic in their twisting, showing their fibres at every turn; and the trunk is often hollow, and even rent into many divisions, like separated stems; but the extremities are exquisitely graceful, especially in the setting-on of the leaves; and the notable and characteristic effect of the tree in the distance is of a rounded and soft mass, or ball, of downy foliage" (Ruskin, "Stones of Venice").

The Olive has been cultivated from time immemorial for the sake of the oil, obtained by pressure from the pulp of its fruit. In some countries, this oil forms an important article of food, besides being extensively used in cooking other articles; but in this country its principal use is in salads, &c. Olives for pickling consist of the unripe fruits deprived of a portion of their bitterness by being soaked in water, to which lime and wood ashes are sometimes added; they are then bottled in salt and water, and flavoured with aromatics. Olive branches have for ages been regarded as emblems of peace and plenty.

A large number of varieties are cultivated, and these are propagated by grafting on the Wild Olive stock. *See also* **Olea.**

OLIVE-BARK TREE. *See* **Terminalia Catappa.**

OLIVERIANA. Included under **Trichopilia** (which *see*).

OLIVE, WILD. *See* **Elæagnus** and **Olea europæa.**

OLIVE-WOOD. *See* **Elæodendron.**

OMALANTHUS. A synonym of *Homalanthus.*

OMENTARIA. A synonym of **Tulbaghia** (which *see*).

OMPHALANDRIA. A synonym of **Omphalea** (which *see*).

OMPHALEA (from *omphalos*, the navel; alluding to the umbilicated anthers). SYNS. *Duchola, Hebecocca, Hecatea, Omphalandria, Ronnowia.* ORD. *Euphorbiaceæ.* A genus comprising eight species of stove, climbing or twining shrubs, rarely diffuse trees; one is a native of Madagascar, and the rest are tropical American. Flowers cymulose, monœcious, apetalous; cymes composed wholly of male flowers, or with one female in the centre, and disposed in terminal panicles. Fruit thick, fleshy externally. Leaves alternate, often large, entire, penniveined, and often three to five-nerved at base; petioles biglandulose at apex. *O. triandra*, the only species yet introduced, thrives in a mixture of peat and loam. Propagated by cuttings, inserted in sand, under a glass, in heat.

O. triandra (three-anthered). *fl.* with three anthers. *fr.* yellow, globose, furrowed, 1½in. in diameter. *l.* oblong, oval, or cordate, glabrous. *h.* 12ft. Jamaica, &c., 1763. Diffuse tree. A juice is extracted from this species, which turns black in drying, and is said to be used in making ink, or as glue; the nuts, after the poisonous embryo is extracted, are edible. (L. B. C. 519.)

OMPHALOBIUM. A synonym of **Connarus** (which *see*).

OMPHALOCOCCA. A synonym of *Ægiphila.*

OMPHALODES (from *omphalos*, the navel, and *eidos*, resemblance; referring to the shape of the seed). SYN. *Picotia.* ORD. *Borragineæ.* A genus of very ornamental, hardy, annual or perennial herbs, distinguished from allied genera in having the four nut-like seeds furnished with an inflexed margin, which renders them cup-shaped. There are about ten species, natives of Europe, North Africa, Western and Central Asia,

FIG. 727. UPPER PORTION OF PLANT OF OMPHALODES VERNA

and Japan. Flowers white or bluish, on slender pedicels, rarely all axillary; racemes loose, ebracteate, or with leafy bracts at base. Radical leaves long-stalked, lanceolate, ovate, or cordate; stem ones few, alternate. The four species in our gardens are of easy culture in any moderately good soil; they are very suitable for naturalising in woods and shrubberies, where the head-growth is not too dense. Propagated freely by divisions, in the spring; or by seeds, sown at the same season.

O. linifolia (Flax-leaved). Venus's Navelwort. *fl.* white, rarely with a tinge of blue, in bractless racemes. June to August. *l.*, radical ones cuneiform; stem ones linear-lanceolate, glabrous,

Omphalodes—*continued.*

with denticulated, ciliated margins. Branches terminating in loose racemes. *h.* 6in. to 12in. South Europe &c., 1748 Annual.

O. Luciliæ (Lucilia's).* *fl.* lilac-blue, nearly ½in. in diameter, much larger than those of *O. verna*. Summer. *l.* oblong-obtuse, radical ones narrowed into a long footstalk; cauline ones sessile, and the upper ovate. *h.* 4in. to 6in. Mountains of Greece and Asia Minor, 1873. A handsome perennial rock plant. (B. M. 6047.)

O. nitida (shining). *fl.* white; racemes very long, ebracteate; pedicels and calyces adpressedly pilose. May. *l.* oblong-lanceolate, nerved, glabrous and shining above, pubescent beneath; lower ones long-stalked; upper ones sessile. Stem erect, branched, glabrous. *h.* 2ft. Portugal, 1812. Perennial. (B. M. 2529.)

O. verna (spring).* *fl.* blue, with a white throat, distant, on long pedicels; racemes bractless, conjugate, few-flowered. March to May. *l.*, radical ones ovate-cordate; cauline ones ovate-lanceolate, petiolate. *h.* 6in. South Europe, &c., 1633. A well-known and extremely pretty perennial, which, when fairly established, makes rapid growth, increasing itself by runners, somewhat like Strawberry plants. See Fig. 727. (B. M. 7, under name of *Cynoglossum Omphalodes.*)

ONAGRARIEÆ. An order of inodorous, annual or perennial herbs, rarely shrubs or trees, a few being aquatic. They are found in all temperate regions, but are rare in the tropics. Flowers generally hermaphrodite, usually axillary and solitary, or else spicate or racemose at the tips of the branchlets, rarely paniculate; calyx tube adnate to the ovary; lobes two or four, rarely five or six, valvate; petals often two or four (rarely none), inserted at the base of the disk, fugacious, twisted. Fruit capsular, nut or berry-like. Leaves opposite and alternate, membranous, entire or rarely pinnatifid, sometimes toothed or serrated; stipules none. The species contain mucous and, occasionally, somewhat astringent principles. The berries, as a rule, are sweet and edible; while the roots of several species of *Œnothera* are also eaten. The order comprises twenty-two genera and about 300 species. Illustrative genera are: *Fuchsia*, *Gaura*, *Œnothera*, and *Trapa*.

ONCIDIUM (from *onkos*, a tumour; referring to the warty crest on the base of the labellum). ORD. *Orchideæ*. A large genus of epiphytal orchids, inhabiting tropical America and the West Indies. Over 250 species have been described, and a large proportion of these have been, or are still, cultivated in English collections; whilst additions are being frequently made, both to the number of species and to those in cultivation. The flowers show remarkable variety, both as regards size, form, and colour; in the latter, yellow predominates. They are borne either in long, flexuose racemes, or in dense, clustering spikes, a few being distinguished by one-flowered scapes; peduncles from the base of the matured pseudo-bulbs generally accompany the new growth. Leaves variable in size and form, often thick and leathery, sometimes thin and papery. Pseudo-bulbs generally compressed laterally, ovate-oblong, rotundate, or cylindrical; in a few species almost or entirely suppressed.

From an altitude of 12,000ft. or 14,000ft., where snow and frost are frequent, and where, at all times, the atmosphere is cool, and laden with moisture, several of our popular garden Oncidiums are obtained; and from this extreme elevation, down to the hot, moist valleys of the most tropical parts of America, the species are found luxuriating under very varied conditions. Some of them grow well only when kept in bright sunlight and a tropical temperature, whilst others require shade, with a medium amount of heat and moisture; others, again, thrive only when kept quite cool and moist, and placed out of the reach of direct sunshine.

The wide range of distribution over which the Oncidiums extend, and the often wide difference in the conditions under which they grow in a state of nature, suggest that, for their cultivation here, houses of both tropical and intermediate, as well as cool, temperatures are necessary, if a representative collection is to be

Oncidium—*continued.*

grown. Taking, first, the tropical species, of which *O. Cavendishianum*, *O. Lanceanum*, and *O. Papilio* may be cited as examples, it will be found that, to grow these well, a moist stove is necessary, and that, during the season when growth is most vigorous, the conditions requisite in the case of East Indian orchids must be maintained for these tropical Oncidiums. During winter, the temperature may be lowered to that of an intermediate house, viz., from 55deg. to 60deg. in the day, and 50deg. at night, and the moisture in the air and at the root be reduced to a minimum. The large-leaved, strong-growing species are best managed when planted in baskets or pots, with a good quantity of peat, sphagnum, and charcoal about their roots; whilst the smaller kinds may be fastened on to rafts or blocks, and suspended near the glass. These last must be watched during warm weather, and prevented from becoming parched; a dip in a pail of water once or twice a day being good for them, even when growing in a house where a continual, moist atmosphere is maintained.

The species requiring what is termed an intermediate house, such as is usually provided for Cattleyas, or even where shrubby Begonias are grown, may be treated as advised for the above as regards moisture, light, potting or rafts, and rest. A considerable number of Oncidiums belong to this intermediate section, some of the most familiar of them being *O. crispum*, *O. Jonesianum*, *O. macranthum*, *O. Marshallianum*, *O. serratum*, *O. varicosum*, &c. Probably, the most beautiful of the Oncidiums are to be found in this group, and if a collection of them were selected from those enumerated below, the wonderful form and exquisite beauty of their flowers would be a source of much greater delight than is generally understood to belong to the genus. The distinct and handsome *O. Jonesianum* is somewhat exceptional in its requirements, as it makes its growth during our autumn and winter, and should be kept as cool and dry as possible from April to September, the period when almost all the other kinds are growing vigorously.

Of the really cool species, there are yet many of remarkable beauty and distinctness. As they may be grown in a house or pit, from which in winter frost alone is excluded, and in summer the temperature kept cool, and the air as fresh and moist as possible, they may be enjoyed by those who do not care to provide heated structures for Orchids. Some of them—for instance, *O. cucullatum* and its forms—are found at very high elevations, where frost is frequent; and *O. æmulum* is equally cool in its native haunts. They require plenty of moisture, both at the root and in the air about them, all the year round; and generally, they succeed best when planted in pots, using for this purpose a mixture of peat, sphagnum, and charcoal.

Propagation is effected by division of the plants. A few of the species which produce long flower-racemes develop young plants in the axils of the branches of these, as in the genera *Epidendrum* and *Phalænopsis*.

In the following list of species, those marked T. are tropical, and require stove treatment; while those marked C. will thrive in a cool house. The remaining species require an intermediate temperature.

O. acinaceum (scimitar-shaped). *fl.* about 1in. across; sepals white; petals large, violet, bordered with white; lip the same colour, shaded with carmine; spikes from 1ft. to 2ft. long. Peru, 1866. A distinct and elegant species.

O. æmulum (rivalling).* *fl.* very large; dorsal sepal of a warm cinnamon colour, nearly reniform in shape; lateral sepals longer, of a yellowish-brown or cinnamon colour; petals very bright cinnamon, all the segments nicely crisped or wavy; lip marked with purple-violet, yellow at its base, with reddish-brown streaks. Peru, &c., 1872. A vigorous-growing species, a worthy rival to *O. macranthum*. (B. M. 5980.)

O. alcicorne (stag's-horn). *fl.* yellow, with pallid streaks, panicled. *l.* ligulate. Pseudo-bulbs oblong, ancipitous. New Grenada, 1872.

Oncidium—*continued.*

O. altissimum (tallest). *fl.* yellow; sepals and petals five, lanceolate, longer than the lip; scape panicled. August. West Indies, 1793. (B. M. 2990; B. R. 1851.) [C.]

O. altissimum (tallest), of Lindley. A synonym of *O. Baueri.*

O. ampliatum (broad-lipped).* *fl.* clear yellow, much paler on the under side; panicle ample, much branched, on a scape about 3ft. in height. Spring and early summer. *l.* solitary, large, thick, and fleshy in texture, of a bright shining green on the upper side, paler below. Pseudo-bulbs large, compressed, apple-green, streaked and spotted with reddish-brown. West Indies and Central America, 1832. This is one of the finest large-growing species of *Oncidium* in cultivation; it should be grown in a pot, and never be allowed to shrivel during the resting seasons. (B. R. 1699.) This is an excellent variety of this, *majus.* [T.]

O. andigenum (Andine). *fl.* yellow, densely covered with small purple dots; column purple, crest of the lip deep golden-yellow; spike erect, from five to seven-flowered. Ecuador, 1869. A very choice species, with the habit of *O. cucullatum.* [C.]

O. annulare (ringed).* *fl.* rich chestnut-brown; sepals with an exceedingly narrow yellow border; petals of the same shade of brown, but with a broad, shining apex and broader border of a very beautiful deep yellow, very wavy (they are coherent at their top, as if glued together, and thus form a ring); lip brown, with a yellow top, the crest with light yellow teeth, two lateral brown disks, yellow centre, and three purplish-violet small teeth before the apex. Summer. 1875. A grand species, closely resembling *O. macranthum* in pseudo-bulb, leaf, inflorescence, and general habit.

O. ascendens (ascending). *fl.* yellow, with red in the region of the crest, and in the form of stains on the sepals and petals; characteristic on account of the incurved column-wings. Mexico and Central America, 1837.

O. aurarium (golden). *fl.* of a fine yellow, spotted with brown; side lobes of lip rectangular; middle lobe triangular, light yellow, with a reddish-brown disk at base, over which are five light sulphur keels, ending in bristles; panicle 4ft. to 5ft. high, with numerous zigzag twigs. *l.* two, ligulate, acute. Pseudo-bulbs compressed, pear-shaped, ribbed, nearly 9in. high. Bolivia, 1884.

O. Balderiamæ (Balderrama's). A synonym of *O. Balderramæ.*

O. Balderramæ (Balderrama's). *fl.* light olive-yellowish-brown; upper sepal rather round, with a very narrow, light yellow border; side sepals unicoloured; petals curved, nearly complicate, crisp, with a yellow border; lip blunt. Summer. Columbia, 1872. Allied to *O. metallicum.* SYN. *O. Balderiamæ.*

O. barbatum (bearded).* *fl.* from 1½in. to 2in. across, but very variable in size; sepals lanceolate, with wavy margins of a pale yellow colour, barred with warm chestnut-brown; lateral sepals connate for half their length; petals oblong, with wavy margins of a clear golden colour, streaked with crimson-brown at the base only; lip triangular, lateral lobes clear golden-yellow, margins of the discal portion fimbriate, and spotted with brown, apical lobe rhombiform and clear yellow; spike from 1ft. to 3ft. long. Summer. Pseudo-bulbs roundish, ovoid, with a well-defined ridge up the centre, one-leaved. Guatemala to tropical America, 1818. (L. C. B. 27.) A very distinct and variable species, some of the varieties having their petals lanceolate, and barred with brown, like the sepals. [T.]

O. b. ciliatum (fringed-lipped). *fl.*, sepals and petals yellow, blotched with red; lip yellow, with fringed plates. Winter. Brazil, 1818. A pretty, compact plant, seldom growing more than 6in. high. (B. R. 1660, under name of *O. ciliatum.*) [T.]

O. Barkeri (Barker's). A synonym of *O. tigrinum.*

O. Batemannianum (Bateman's). *fl.* bright yellow. Mexico, 1838. A very distinct and good species, about 1½ft. high, and with pale green foliage; does not, however, blossom freely. There are several desirable varieties. [C.]

O. B. ramosum (branched). *fl.* brilliant yellow, disposed in a very large panicle; sepals and petals banded with rich chocolate. Brazil. [C.]

O. B. spilopterum (spotted-winged). *fl.* racemose; sepals and petals green outside, red inside; middle front tooth of the crest much larger than the others. Brazil, 1844. (B. R. 1845, 40, under name of *O. spilopterum.*) [C.]

O. Baueri (Bauer's). A species often mistaken for *O. altissimum*, from which it differs in its scape being panicled from the very base, in its longer pseudo-bulbs, and in its sharply truncated column-wings. West Indies, &c. (B. R. 1651, under name of *O. altissimum.*)

O. bicallosum (two-warted).* *fl.*, sepals and petals dark brown; lip bright yellow; spike erect, many-flowered. Winter. *l.* solitary, dark green, thick, fleshy. Guatemala, 1842. A showy, dwarf-growing species. (B. M. 4148.) [T.]

O. bifolium (two-leaved).* *fl.*, sepals and petals greenish-brown, tinged with yellow; lip large, measuring sometimes as much as 1½in. across, bilobed in front, and wholly rich golden-yellow in colour; racemes loose, about 1ft. long. Winter. *l.* oblong, often tinged with bronze. Pseudo-bulbs brownish, fluted, 1in. to 2in. high. Monte Video, 1811. (B. M. 1491.) A handsome, free-flowering, dwarf-growing species. The variety *majus* is, however, now most esteemed in cultivation; it differs from the type only in its larger size and handsome flowers. [T.]

Oncidium—*continued.*

O. bifrons (two-faced). A synonym of *O. Warscewiczii.*

O. brachyandrum (short-anthered). *fl.* cinnamon colour, with a yellow lip; peduncles slender, one or two-flowered. *l.* grassy, ligulate. Pseudo-bulbs oblong, flattened. South Mexico, 1871. A delicate little species.

O. Brunleesianum (Brunlees'). *fl.*, sepals and petals greenish-yellow, brownish towards their lips, the petals striped with brown, the lateral sepals connate and bidentate; lip broad, trifid; side lobes erect, yellow; front lobe purple-brown; callus of two straight, parallel keels, a few small tubercles between them, and two before them, yellow on white, with red bars. 1883. A pretty species.

O. bryolophytum (moss-plumed). *fl.* golden, standing singly among a moss-like mass of greenish, stellate, abortive flowers (whence the specific name); panicles elongated. Pseudo-bulbs pyriform, flattened. Central America, 1871.

O. calanthum (beautiful-flowered).* *fl.*, sepals and petals light yellow, somewhat oblong, nearly as long as the lip; lip broad, deep yellow, the crest of the lip and column being stained with red; spike long, many-flowered. Ecuador, 1870. A pretty and distinct, free-flowering species. (F. M. 384.)

O. Carderi (Carder's).* *fl.* light coffee colour, with the petals half white, the superior part of the lip yellow, and the anterior pink, disposed in large panicles, equalling those of *O. æmulum.* *l.* linear-lanceolate, acute. Pseudo-bulbs oblong-ligulate, compressed. Columbia, 1875. A showy plant. [C.]

O. carthaginense (Carthagenian). *fl.*, sepals and petals five, obovate-unguiculate, a little shorter than the lip; scape panicled. Summer. *h.* 4ft. West Indies, 1791. [T.]

O. c. sanguineum (bloody-blotched). *fl.* smaller than usual, pale yellow, with irregular bright crimson spots. (B. M. 3806, under name of *O. Huntianum.*)

O. c. Swartzii (Swartz's). *fl.* whitish, variegated with ferruginous and purple; petals paler. (B. M. 777, under name of *Epidendrum undulatum.*)

O. Cavendishianum (Cavendish's).* *fl.* yellow, produced in great abundance from strong, branching panicles. Winter. *l.* large, broad, fleshy, rich and lively green. Guatemala. (B. M. 3807, under name of *O. pachyphyllum.*) [T.]

O. C. longifolium (long-leaved). This variety has large "flowers, in a dense panicle; lateral lobes of lip dolabriform; sepals and petals very blunt. *l.* long, spreading on the ground" (Lindley). SYN. *O. longifolium.* (B. R. 1842, 4.)

O. Cebolleta (Cebolleta).* *fl.* yellowish-red, spotted; sepals and petals obovate-acute; middle segment of lip reniform, wavy; crest wavy, truncate; wings of column scimitar-shaped; scape panicled, stiff. Summer. *l.* terete, subulate. *h.* 1ft. Carthagena, 1824. (B. M. 3568; B. R. 1994.) [T.]

O. cheirophorum (hand-bearing). *fl.* bright yellow, very sweet-scented, about ½in. in diameter; scape slender, drooping, bearing an elongated, densely crowded cluster of blossoms. *l.* linear-lanceolate, 3in. to 6in. long. Pseudo-bulbs compressed, with sharp margins, about 1in. long. Panama, 1860. (B. M. 6278.) [C.]

O. chrysornis (golden-bird). *fl.* yellow, with four or five cinnamon spots, very numerous, borne in a wide, zigzag panicle. *l.* one or two to a bulb, cuneate-lanceolate, acute. Pseudo-bulbs small, narrow, ligulate, shouldered. Ecuador, 1881. [C.]

O. chrysothyrsus (golden-thyrsed).* *fl.*, sepals and petals green, streaked with red; lip large, bright yellow; panicle branching, about 3ft. long, many-flowered. Pseudo-bulbs oblong, compressed, two-leaved. South Brazil, 1867. A very showy species, with a free, compact growth, and remaining in blossom for a long time. (W. S. O. ser. ii. 5.)

O. ciliatum (fringed-lipped). A synonym of *O. barbatum ciliatum.*

O. citrinum (citron-coloured). This is the correct name of plant described in this work as *Cyrtochilum citrinum.*

O. concolor (one-coloured).* *fl.* rich golden-yellow, 1½in. to 2in. in diameter; lip large and flat; racemes long, drooping, many-flowered. Early summer. Organ Mountains, 1839. A very distinct and singular species. (B. M. 3752.) [C.]

O. cornigerum (horn-bearing).* *fl.* yellow, spotted with red, very showy, disposed on a prettily-marked spike, which is formed after the growth is mature. Summer. Pseudo-bulbs 9in. long, bearing deep green leaves of a peculiarly thick and fleshy texture. Brazil, 1829. Very distinct. (B. M. 3486.) [C.]

O. crispum (curled-petaled).* *fl.* from 1in. to 2in. across; sepals and petals of a bright rich copper-colour; lip broad, similar in hue, the centre being blotched with golden-yellow; raceme erect, many-flowered. Winter. *l.* twin, oblong, often tinged with bronze. Pseudo-bulbs brownish, fluted, 1in. to 2in. high. Organ Mountains, Brazil. See Fig. 728. (B. M. 3499; B. R. 1920.) There are several varieties of this very distinct species, all more or less beautiful. The following are most desirable: *grandiflorum*, having the flowers unusually large (F. M. 485); *marginatum*, in which the sepals and petals are broadly margined with rich golden-yellow; and *olivaceum*, with olive-green flowers, having

Oncidium—*continued.*

the basal area of the front lobe of the lip yellow, and the calli, column, wings, and a few blotches at the base of the lip, purple-black.

O. crista-galli (cockscomb). *fl.* lemon-colour, having a few pink blotches on both sepals and petals, rather large, racemose. *l.* cuneate-ligulate. Peru, 1870. An elegant, small-growing species.

O. Crœsus (Crœsus). *fl.*, sepals and petals greenish-yellow, tinged with brown; lip large, rich golden-yellow, the crest prominent and deep velvety black; scapes short, few-flowered. Summer. Pseudo-bulbs slender, tapering upwards, supporting a pair of light green leaves. Tropical America, 1872. A pretty, dwarf-growing species. (F. M. n. s. 40.)

O. cruciatum (cruciate). *fl.* bright yellow and red; sepals mostly obovate-obtuse; petals ligulate; lip trifid, white, with two additional slender horns over the lateral ones; panicle loosely-flowered. Winter. *l.* solitary, obscurely nerved, somewhat coriaceous, acute. Pseudo-bulbs clustered, nearly cylindrical, furrowed. Brazil, 1838. SYN. *O. pubes flavescens.* (B. M. 3926.)

O. cryptocopis (hidden-sword). *fl.* chestnut-brown, with yellow streaks, and a yellow margin around the crisped and toothleted sepals and petals; superior petal with a long claw and two auricles at its base; lower petals with very short and broad claws; lip highly curious, having triangular laciniæ, of a purplish-brown colour, with a bent forward anterior part, and many toothlets on the posterior side; the claw whitish flesh-colour, and the border sulphur-yellow; wings purplish-brown, with two swordblade-like laminæ under the stigmatic hollow; spike many-flowered. Spring. Peru, 1870. A rare species, having flowers as large as those of *O. serratum.* (B. M. 5858.)

O. cucullatum (hooded).* *fl.* usually purplish-brown, with a large lip, which is rosy-lilac or rosy-purple, spotted with deep purple; spike slender, erect, bearing from three to six or more beautiful blossoms. *l.* solitary, linear-oblong, acute. Pseudo-bulbs small, oblong. Peru, New Grenada, &c. This very variable, dwarf species may be grown either upon a block of wood or in a pot; it must never be dried off, but kept slightly moist all the year round, when it will prove almost a perpetual blossomer. (L. & P. F. G. 87.) There are a number of varieties of this species; all are handsome, and last a long time in full beauty. [C.]

O. c. flavidum (yellowish). *fl.*, sepals and petals yellow, blotched with brown; lip purple, margined with white. Spring. New Grenada. Similar in habit to the type, and most desirable. [C.]

O. c. giganteum (giant). This is simply a fine variety, differing from the type only in its larger flowers and more robust habit. [C.]

O. c. macrochilum (large-lipped).* *fl.*, sepals and petals rich plum and crimson; lip mauve, spotted with dark violet. New Grenada. A distinct variety, growing about 1ft. high, and producing flower-spikes 2ft. in length, upon which are borne its beautiful flowers. [C.]

O. c. nubigenum (cloud-born). *fl.*, sepals and petals brownish, with a crimson or nearly crimson hue, or striped with crimson lines; lip very variable, but generally white, yellow at the base, marked with violet or purple. Andes, 1867. SYN. *O. Denisonianum.* (B. M. 5708.) [C.]

Other varieties are: *Dayanum*, white, purple; *Phalænopsis*, brown, white, purple, yellow; and *spathulatum*, sepals and petals spotted, lip spotted at base.

O. curtum (shortened). *fl.*, sepals and petals yellow, barred and blotched with cinnamon-brown; lip golden-yellow, spotted towards the margin with dark purple; spikes long, branching, many-flowered. Spring. Brazil, 1875. A very handsome and distinct species, of compact growth, and resembling *O. crispum* in foliage and shape of the pseudo-bulbs. (B. R. 1847, 68.)

O. dactylopterum (finger-winged). *fl.* yellow, with brown spots, disposed in small, loose panicles. *l.* linear-lanceolate. Pseudo-bulbs pyriform. Columbia, 1875.

O. dasystyle (thick-styled).* *fl.*, sepals ochre colour; petals brownish-purple; lip bright yellow, with a long purple callus, and some purplish veins on the base. January. *h.* 6in. Brazil, 1873. (B. M. 6494.) A handsome, dwarf-growing species.

FIG. 728. FLOWERS OF ONCIDIUM CRISPUM.

O. decipiens (deceptive). *fl.* yellow; upper sepals obtuse, lateral ones acute; petals obtuse, undulated, larger; lateral lobes of lip small, almost round, unguiculate; middle lobe much larger, bilobed; scape simple, usually one-flowered. *l.* ensiform, shortly equitant. *h.* 3in. Mexico, &c., 1835. (B. R. 1911, under name of *O. iridifolium.*)

O. deltoideum (triangular). *fl.* yellow, arranged in a large, stiff, compact panicle; sepals and petals whole-coloured; crest of the lip reaching more than half-way from the base to the point, consisting of numerous straggling warts and teeth. Peru, 1836. (B. R. 2006.)

O. Denisonianum (Denison's). A synonym of *O. cucullatum nubigenum.*

O. diadema (diadem).* *fl.* about 100 to a stem; sepals and petals shining chocolate-brown; lip fine yellow; the extremities of the petals, joined together above the column, present the aspect of a diadem (whence the specific name); flower-stem 2ft. to 3ft. high, branched. Pseudo-bulbs large. Cool region of equatorial America, 1866. [C.]

O. diadema (diadem), of gardens. A synonym of *O. serratum.*

O. dimorphum (two-formed). *fl.* yellow, spotted with brown, paniculate; lip sometimes three-lobed, and sometimes almost entire. *l.* oblong-lanceolate, bluntish. Pseudo-bulbs oblong, compressed. Brazil, 1870. (R. G. 637, Figs. 4-6.)

Oncidium—*continued.*

O. diodon (two-toothed). *fl.* brown; lip emarginate, square, with a light yellow callus. Pseudo-bulbs like those of *O. macranthum*. 1880.

O. divaricatum (spreading).* *fl.* produced on long, branching spikes; sepals and petals yellow, blotched and barred with brown; lip orange-yellow. Summer. *h.* 1½ft. Brazil, 1826. An easily-grown, free-flowering species. (B. R. 1054; L. B. C. 1212.)

O. dubium (doubtful). *fl.*, upper sepal brown, edged with white; lateral ones white, with obscure purple dots; lip pandurate, the front lobe brown, margined with white, lateral lobes streaked with violet. *l.* minute, carinate, 2in. to 2½in. long. Plant bulbless, of dwarf habit. (I. H. 1873, 184.)

O. elegantissimum (very elegant). *fl.*, sepals brown, with narrow, yellow bands; petals broad, with a few yellow spots; lip very bright yellow, the anterior limb beautifully marbled and dotted with light brown, and the calli of the base with black-purplish borders; panicle large, many-flowered. Winter. Brazil (?), 1877. [T.]

O. endocharis (beautiful). *fl.* bright orange, about five; sepals and petals cuneate-oblong, acute; lip ligulate, with a broader, rhombic, emarginate blade, with two large lamellæ and three teeth at the base; raceme slender. 1884. A small species.

O. Eurycline (Eurycline). *fl.*, sepals and petals light reddish-ochre, with a few dark bars at their base; lip yellow, with a brown spot on the isthmus; basal auricles rounded, retrorse, narrower than the front blade. *l.* blunt. 1884.

O. euxanthinum (beautiful yellow).* *fl.*, sepals and petals small, greenish-yellow, banded with brown; lip large, rich yellow; spikes ample, many-flowered. Brazil, 1869. A very pretty species, with the habit of *O. bifolium*. (B. M. 6322.)

O. exasperatum (rough). *fl.* chestnut colour, having asperities on the outer side of the sepals and petals; lip yellowish, with brown bars and an orange callosity. Ecuador, 1871.

O. excavatum (hollowed).* *fl.*, sepals and petals golden-yellow, spotted and blotched at the base with rich bright brown; lip golden-yellow, very convex at the base, a little hollowed out in front, and excavated with a deep pit in the under side; panicle much branched, sometimes bearing upwards of a hundred blossoms. *l.* long, pale green. Pseudo-bulbs large, pale green. Peru, 1840. A robust-growing species. See Fig. 729. (B. M. 5293.) In a variety sometimes known as *O. aurosum*, the flowers are dark brown in the centre, and somewhat larger in size than those of *O. excavatum*.

FIG. 729. PORTION OF PANICLE OF ONCIDIUM EXCAVATUM.

O. flexuosum (zigzag).* *fl.* yellow, spotted with brown, rather small, produced in abundance on a branched panicle 3ft. to 4ft. high. Pseudo-bulbs flat, borne at short intervals on a creeping stem, two-leaved. Brazil, 1818. A free-flowering species, of easy culture. (B. M. 2203.) The variety known as *majus* has much larger flowers, while that known as *radiatum* has beautiful, radiating, purplish-brown lines on the disk.

Oncidium—*continued.*

O. Forbesii (Forbes').* *fl.* large and very distinct; sepals, petals, and lip, with pale yellow edges, broad, the centre reddish-brown, except the eye or throat, which is white. November. Brazil, 1837. A beautiful species, nearly allied to *O. crispum*, but of stronger habit, and with much handsomer flowers. (B. M. 3705.)

O. F. Borwickianum (Borwick's). A handsome variety, having the whole lip bright yellow, with feathered blotches in lieu of a wide, brown, one-coloured disk, and a yellow spotted margin. 1879. (G. C. n. s., xi. 524.)

O. fuscatum (brown-stalked). A synonym of *Miltonia Warscewiczii*.

O. Gardneri (Gardner's). *fl.* brown, with a yellow lip, moderately large. "Very near *O. crispum* and *Forbesii*, from which it differs in the form and tuberculation of the lip, and the very small column-wings" (Lindley). Brazil.

O. Gautieri (Gautier's). *fl.* small, disposed in few-flowered racemes; sepals and petals dark brown, lanceolate; lip subcordate, semi-orbicular, crenulato-undulate, broader than long, yellow, with a deep blood-red spot, from which projects a long, curved, yellow horn. *l.* linear-lanceolate, coriaceous. Pseudo-bulbs oblong, sulcate, one-leaved. Brazil, 1869. (R. G. 611, Fig. 2.)

O. globuliferum (globule-bearing). *fl.* golden-yellow, with red spots at the base of sepals, petals, and lip; sepals cuneate-oblong, acute; lip sagittate; peduncles axillary, branched, long or short. *l.* ligulate, small. Pseudo-bulbs small, glaucous, oblong, produced at long intervals on the slender, creeping, filiform rhizomes. Columbia.

O. g. costaricense (Costa Rica). This is considered to be only a local variety, with smaller flowers. Costa Rica, 1871.

O. glossomystax (bearded-tongued). *fl.* light yellow, with a few brown blotches, rather large, almost sessile, having two pairs of keels on the basilar disk of the lip, all of which are covered with white hairs. New Grenada, 1880. A minute plant, with Iris-like leaves.

O. graminifolium (grass-leaved). *fl.* disposed in a sub-paniculate raceme; lip yellow, wedge-shaped, with rounded angles. *l.* linear-ensiform, acute, erect, shorter than the raceme. Mexico. [C.]

O. g. filipes (thready). *fl.*, sepals and petals brownish, clouded; lip emarginate, somewhat lobed; raceme nearly or quite as long as the scape. (B. R. 1841, 59, under name of *Cyrtochilum filipes*; L. S. O. 48, under name of *O. filipes*.)

O. g. Wrayæ (Wray's). *fl.* panicled; sepals and petals bright yellow, with deep brown spots; lip emarginate, somewhat four-lobed. (B. M. 3854, under name of *O. Wrayæ*.)

O. grandiflorum (large-flowered). *fl.* closely resembling those of *O. macranthum*, but the petals are more acute, and both the petals and odd sepal are more crisp, embellished by a yellow border; lip with a spathulate lacinia, and a quite distinct, flat callus, totally wanting the keel of the middle line; peduncle very large, many-flowered. Summer. Columbia, 1881. A very beautiful but rare species.

O. gyrobulbon (twisted-bulbed). *fl.* yellow, with dark spots at the base of the lip; inflorescence panicled. Pseudo-bulbs oblong-pyriform, at length becoming twisted. 1869. [C.]

O. hæmatochilum (bloody-lipped). *fl.*, sepals and petals greenish-yellow, blotched with chestnut; lip rich crimson and rose; spikes erect, with several moderate-sized blossoms. Winter. *l.* short, thick, fleshy, dark green. *h.* 6in. New Grenada, 1857. A compact-growing species, similar in habit to *O. Lanceanum*. (L. & P. F. G. 6.) [T.]

O. Harrisonianum (Harrison's). *fl.* yellowish-purple, spotted; sepals and petals linear obtuse; lip three-lobed, middle segment emarginate; crest five-lobed, downy in the centre; panicle branched, many-flowered. Autumn. *l.* fleshy, linear-oblong, acute, recurved. Pseudo-bulb sub-globose, one-leaved. *h.* 1ft. Brazil, 1830. (B. R. 1569.)

O. hastatum (halbert-shaped). *fl.* yellowish, with many brown dots; lip yellowish-white, with a darker yellow callus; inflorescence panicled. Mexico.

O. hebraicum (Hebrew). *fl.* yellow, with dark maroon blotches, growing in long, slender, short-branched panicles; lip having a small blotch on each auricle, and a similarly coloured patch around and before the crests. *l.* cuneate-ligulate. Pseudo-bulbs oblong, compressed, wrinkled. New Grenada, 1875.

O. Hrubyanum (Hruby's). *fl.* brown, barred with yellow at the bases of the sepals and petals, small, in a dense panicle. 1883. A curious species.

O. Huntianum (Hunt's). A synonym of *O. carthaginense sanguineum*.

Oncidium—*continued.*

O. hyphæmaticum (blood-red). *fl.* blood-red on the outside, large; sepals and petals purplish-brown, blotched with a deeper hue of the same colour; lip rich deep yellow; raceme loose, branching. Summer. *l.* solitary, oblong-lanceolate, obtuse. Pseudo-bulbs small, oblong. Ecuador, 1869.

O. incurvum (incurved).* *fl.* pure white, streaked and blotched with lilac and brown, very fragrant, rather small in size; scapes about 3ft. in height, much branched, bearing an immense number of flowers. Autumn and winter. *l.* pale green, as are also the pseudo-bulbs. Oaxaca, Mexico, 1839. A very elegant, dwarf, compact-growing, cool-house species. (B. R. 1845, 64.) [C.]

O. i. album (white). A handsome, white-flowered variety. 1882. (I. H. 444.)

O. insculptum (carved). *fl.* of a cinnamon-brown colour, with a yellowish-white border, undulated, disposed in large panicles; lip pale yellow at the base. Tropical America, 1872.

O. Jamiesoni (Jamieson's). *fl.* yellow, spotted with violet-purple; upper sepals, and the unguiculate, hastate petals, with basal or median purple blotches; lip bright yellow, broad, pandurate; inflorescence large. Peru, 1878.

O. janëirense (Rio de Janeiro). A synonym of *O. longipes.*

O. Jonesianum (Jones').* *fl.*, sepals and petals whitish-ochre, with brown blotches, cuneate-oblong, wavy, erect; lip with small, light yellow auricles and a white blade, marked with a few purple and brown blotches; callus of two patellar bodies, the smaller one in front, and traversed by a strong keel. *l.* subulate, thin.

O. Kappleri (Kappler's). *fl.* yellow, brown; column-wings crisp, lobed, extended into a toothed, truncated, ligulate appendage at the base, resting on a pair of projecting angles. *l.* ensiform, similar to those of *O. altissimum.* Surinam, 1880.

O. Kienastianum (Kienast's). *fl.* yellowish-brown at first; petals yellow, with numerous brown bars and spots; afterwards, the colour deepens, and the stalked ovaries are dark purplish; otherwise, the flowers resemble those of *O. trilingue.* *l.* and pseudo-bulbs similar to those of *O. serratum.* Peru, 1878.

O. lamelligerum (ridge-bearing). *fl.*, upper sepal deep brown, with a yellow border, reniform, wavy, stalked; lower ones longer, stalked, oblong, unequal at base, cuneate on one side, semi-hastate on the other; petals yellowish, with brown patches, having broad claws, suddenly hastate, oblong, obtuse, undulate, complicate, crisp; lip trifid, with remarkable lamellæ, the side ones of the anterior retrorse and lobed. Ecuador, 1877. [C.]

O. Lanceanum (Lance's).* *fl.* with an exquisite fragrance of vanilla; sepals and petals large, thick, and fleshy, ground-colour yellow, tinged with green, barred and blotched with chocolate-brown, in some instances almost with crimson; lip large, rich violet in its lower portion, rose above; spike erect, many-flowered. *l.* thick, leathery, large, bright green, beautifully spotted with reddish-brown. Demerara and Surinam, 1834. A very handsome plant, considered by some growers to be the best of the genus; it is, however, rarely seen in good condition. (B. R. 1887.) There is a most desirable variety in which the lip is pure white. In another form (*Louvrexianum*) the flowers are yellow, prettily spotted and marbled, the lip deep mauve at the base, white in front. [T.]

O. Lansbergii (Lansberg's). *fl.* honey-yellow-green, with blotches of chestnut colour, three or four in a slender raceme. *l.* cuneate, cordate-oblong, obtuse, very cartilaginous. Pseudo-bulbs minute, one-leaved. Venezuela, 1876.

O. Lemonianum (Sir Charles Lemon's). *fl.* yellow, marked along the back with red spots, about ⅜in. in diameter; lip of a brighter colour, very handsomely spotted with red; column also yellow; spike 10in. long, and about six-flowered. Summer. Cuba, &c., 1836. A pretty and curious species, of very dwarf growth. (B. R. 1789.) [C.]

O. lepidum (charming). *fl.* yellowish, blotched with brown, disposed in a large panicle; lip yellow, purple towards the base. Ecuador, 1870. A small species.

O. leucochilum (white-lipped).* *fl.*, sepals and petals greenish, transversely streaked with bands of brown, or, in some varieties, deep crimson, or in unison, lanceolate, undulate; lip large, at first pure white, but subsequently becoming yellow or yellowish; scapes stout, much branched, 6ft. to 10ft. in height. Winter. Pseudo-bulbs two-leaved, large, of a glaucous hue, and fluted. Mexico and Guatemala, 1835. SYN. *Cyrtochilum leucochilum* (F. d. S. 522).

O. l. Dawsonianum (Dawson's). *fl.* large; sepals and petals greenish-yellow, with blackish-maroon spots; lip yellowish-white, marked with purplish-violet. Mexico, 1873. A very fine variety.

O. l. speciosum (showy). *fl.*, sepals and petals sub-elliptic; lip pure white in all its stages. Mexico, 1874.

O. Limminghei (Limminghe's). *fl.* golden-yellow, richly spotted with brown; lip auricled, blunt, spreading; peduncle filiform, one or two-flowered. *l.* oblong-acute. Pseudo-bulb ovate, ancipitate. Caraccas, 1868. A very singular species, with habit similar to that of a Sophronitis. (F. d. S. 1827.) [C.]

O. linguiforme (tongue-shaped). *fl.* yellow, with a pale purplish lip, which is pandurate, obtuse, and has three keels on the basal part, the middle one being much the shortest; panicle lax, at the end of a very long, weak scape. Venezuela, 1879. Plant of large growth.

O. litum (daubed). *fl.*, petals brown, with a yellow border; lip yellow, blotched with brown on the hinder part, and entirely brown in front; the callus consists of a central ligulate body, with two blunt front lobes, covered with blunt papillæ, and on each side is a curved line of papillæ. Brazil, 1883.

O. longifolium (long-leaved). A synonym of *O. Cavendishianum longifolium.*

O. longipes (long-stalked). *fl.*, sepals and petals greenish-yellow, streaked or suffused with reddish-brown; lip broad, of a rich deep yellow, the crest being prominent, and surrounded by a broad, blood-coloured ring; scape slender, few-flowered. Summer. *l.* twin, narrow, fleshy. Pseudo-bulbs in clusters, from a creeping rootstock. Organ Mountains. A very dwarf-growing species. SYN. *O. janëirense.* [C.]

FIG. 730. FLOWER OF ONCIDIUM LURIDUM.

O. luridum (lurid). *fl.* usually of a dull yellow or olive-green, blotched or spotted with brown; panicle long, much branched, attaining sometimes the length of 8ft. or 9ft., many-flowered. *l.* large, fleshy, with a sharp keel behind, and of a dark green colour. Mexico, &c., 1822. A very desirable but not showy species. See Fig. 730. (B. M. 3603.) [T.]

O. l. Dodgsoni (Dodgson's). A splendid but rare variety, having orange and yellow flowers, barred with dark brown, and numerously disposed on much-branched spikes 7ft. long. West Indies.

O. l. guttatum (spotted). A fine form, producing long spikes of yellow, brown, and red flowers. (B. R. 1839, 16.)

O. l. Morreni (Morren's). *fl.* pale rose colour, spotted with crimson, and tipped with yellow.

O. l. roseum (rosy). *fl.*, sepals and petals rosy, mottled with white, and bordered with yellow.

O. macranthum (large-flowered).* *fl.* from 3in. to 4in. in diameter; sepals and petals roundish, oblong, thick, tough, and leathery in texture, golden-yellow, tinged with purplish-brown or purplish-red, the petals being also often streaked with crimson; lip hastate, thick and fleshy, with a white crest, the middle lobe being yellow, and the lateral ones rich purplish-brown; panicle climbing and branched, producing a large number of flowers. Spring and early summer. *l.* narrow, 1ft. long, bright green. Pseudo-bulbs 3in. long, flask-shaped, much ribbed. Central America to Peru, 1867. One of the handsomest orchids grown. It has numerous varieties, some being of very second-rate merit. (B. M. 5743; F. M. 386.)

O. macropus (long-stalked). *fl.* yellowish, with a few transverse blotches and bars, panicled. Pseudo-bulbs resembling those of *O. macranthum.* Ecuador, 1868.

O. maculatum (spotted). The proper name of plant described in this work as *Cyrtochilum maculatum.*

O. Marshallianum (Marshall's).* *fl.* from 2in. to 3in. across, of a rich golden-yellow, marked with brown spots and blotches. South America, 1866. A handsome plant, closely resembling *O. crispum,* but its pseudo-bulbs and leaves are pale green instead of reddish-brown or bronze-coloured. (B. M. 5725.)

O. Martianum (Martius'). *fl.*, sepals and petals bright yellow; lip very large, deep yellow on the upper side, almost white underneath. Autumn. Brazil, 1841. A very handsome species, thriving best when grown on a block, suspended from the roof. *O. bicolor* (B. R. 1843, 66) only differs from this in the petals being spotted.

O. Massangei (Massange's). *fl.* in a long, racemose panicle; sepals and petals yellow, blotched with purple-brown to just above their middle; lip with oblong, truncate, spreading auricles at base, and a broad, dilated, bilobed front part, yellow, with a band across the base of each auricle, and at the base of the dilated front part, of purple-brown; crest also spotted with purple-brown. *l.* linear, acute, 1ft. or more long, 1½in. broad. Central America, 1878.

Oncidium—*continued.*

O. meirax (boy). *fl.* with little yellow and brown spots; sepals and petals linear, a little narrowed at the base; lip cordate, acuminate; scape two-flowered. *l.* solitary on the oblong pseudo-bulbs, slightly emarginate. Caraccas and New Grenada, 1880. A singular plant, only a few inches high. (R. X. O. t. 18, Fig. 3.) [C.]

O. melanops (black-eyed). *fl.* light yellow, with the bases of the sepals, petals, and lip blackish-purple. Ecuador, 1881. In habit, this species resembles *O. chrysornis.*

O. meliosum (honey-scented). *fl.* very rich yellow, with cinnamon blotches; small sepals, as well as the much larger petals, retuse; basilar auricles of the lip square, the isthmus middle-sized, and the anterior part reniform; column very small, of the most pallid sulphur-white, as well as the callus; panicle branched. Summer. *l.* cuneate-oblong, ligulate, acute. Pseudo-bulbs oblong. 1882.

O. metallicum (metallic). *fl.* rich chestnut-brown, with a splendid metallic hue; the borders of the short, ovate, broad, superior sepal and smaller petals blotched with rich yellow; lip pandurate, with an angle projecting from each side. New Grenada, 1876. Very distinct.

O. Millianum (Mill's). *fl.* bright yellow, mottled with brown, the five sepals and petals nearly equal; lip bent at the base, brown in the middle; column very short, two-winged; panicle ample, loose-flowered, diffuse. Spring. *l.* ligulate, obtuse. Pseudo-bulbs ligulate, compressed. Columbia, 1878.

Oncidium—*continued.*

O. monoceras (one-horned). A synonym of *O. unicorne.*

O. nigratum (blackish). *fl.* cream colour, with dark blackish-brown spots and bands, disposed in branched panicles; sepals and petals linear-lanceolate, equal, and wavy. Guiana.

O. oblongatum (oblong-leaved).* *fl.* bright yellow, of good size. Winter. *l.* bright green, oblong, about 1ft. long. Pseudo-bulbs short, thick. Guatemala, &c., 1844. A handsome, free-flowering species. (L. & P. F. G. ii. 9, Fig. 137.)

O. obryzatum (refined). *fl.* bright golden-yellow, barred with brown, about 1in. across, yielding a delicious perfume; spikes numerous, long-branched, and many-flowered. Winter. Peru, 1863. An easily-grown and very free-flowering species. (R. G. 925.)

FIG. 731. ONCIDIUM PAPILIO, showing Habit and detached Flower.

O. octhodes (tubercled). *fl.* yellow, having the lip painted with brownish bars, large, distinct, borne in an effuse panicle. Ecuador, 1871. A handsome orchid. [C.]

O. onustum (loaded). *fl.* rich golden-yellow, disposed in dense, nodding racemes. Winter. Panama, &c., 1848. A handsome species, with the habit of *O. bifolium*, but the pseudo-bulbs are beautifully spotted.

O. ornithorhynchum (bird's-bill).* *fl.* soft rose-purple, yielding a perfume somewhat resembling that of the Heliotrope, but less powerful; scapes produced in great abundance, and the gracefully drooping panicles thickly laden with the comparatively small blossoms. Autumn and winter. *l.* twin, oblong. Pseudo-bulbs glaucous, 1in. to 2in. high. Mexico, &c. 1826. A well-marked

Oncidium—*continued.*

and very distinct species, of compact, dwarf-growing habit. (B. M. 3912; B. R. 1840, 10.) [C.]

O. o. albiflorum (white-flowered).* A valuable acquisition as a winter blossomer, having snow-white flowers. It is, however, very rare. Guatemala, 1873. Sometimes known as *O. o. album.* (F. M. 398.) [C.]

O. pachyphyllum (thick-leaved). A synonym of *O. Cavendishianum.*

O. Papilio.* Butterfly Plant. *fl.* pale golden-yellow, barred with chestnut-brown, usually solitary and terminal on the spike, somewhat resembling a large butterfly in shape; sepals long, narrow, erect, bearing a fanciful resemblance to the antennæ and proboscis of a butterfly; petals extending horizontally to form the wings, and the lip representing the body. *l.* deep olive-green, beautifully streaked and spotted with reddish-brown. Pseudo-bulbs somewhat compressed, one-leaved. Trinidad, 1823. A remarkable and beautiful plant. It succeeds best upon a large block of wood, and with good exposure to sun and light. The flowers are often 2in. across. The old spikes should not be cut off, as new buds are continually developed at the apex. See Fig. 731. (B. M. 2795; B. R. 910.) [T.] There are some striking varieties of this species, of which the following are noteworthy:

O. P. album (white). A very rare form, with white flowers.

O. P. Eckhardti (Eckhardt's). A fine and large-flowered variety. (I. H. 500.)

O. P. Kramerianum (Kramer's).* *fl.* rich golden-yellow, with a profusion of irregularly disposed, bright brown spots and blotches; the margins of the lip and lateral sepals beautifully undulated and crisped; spike long, contracted at intervals, forming knotty joints, one-flowered. *l.* solitary, large, coriaceous, beautifully spotted with crimson and red, upon a dark ground. Pseudo-bulbs cylindrical, deep brown. Central America, 1823. A very beautiful plant. (R. X. O. 33.) [T.]

O. P. limbatum (bordered). *fl.* clear yellow, with distinct cinnamon-brown blotches, and a broad, uninterrupted margin of the same hue. (B. M. 3733.)

O. pectorale (breast-plate). *fl.* bright yellow, thickly spotted, blotched, and barred with reddish-brown; lip having at its base a number of tubercles, curiously arranged, and studded with little button-like knobs. Spring. Brazil, 1842. A curious and handsome species.

O. pelliogramma (blackish-dotted). *fl.* pale yellow, slightly marked with pallid dots and bars, paniculate. Chiriqui, 1871.

O. Phalænopsis (moth-like).* *fl.*, sepals and petals nearly equal, of a soft cream colour, beautifully spotted and streaked with crimson and violet; lip large, ground colour creamy-white, having a rich yellow crest, and covered with spots and bars in a similar manner to the sepals and petals; spike erect, three to six-flowered. *l.* twin, narrow, borne upon the summit of the ovate, deep green pseudo-bulbs, which are 3in. long. Peru, 1869. A beautiful, dwarf-growing species, blossoming at various periods, and continuing a long time in full beauty. When out of flower, it cannot be distinguished from some of the varieties of *O. cucullatum.* (I. H. 1870, 13.) [C.]

O. phylloglossum (leaf-tongued). *fl.* shining, light horse-chestnut-brown; sepals and petals bordered with light yellow, the odd sepal and the petals being unusually wavy; lip with yellow borders at the very base and a white top, triangular; calli light yellow; panicle branched. *l.* cuneate-lanceolate, acutish. Pseudo-bulbs oblong-pyriform, two-leaved. Columbia, 1880.

O. phymatochilum (long-lipped). *fl.*, sepals and petals yellow and reddish-brown; lip white. Summer. *l.* dark green, about 1ft. long. Pseudo-bulbs thick. Brazil, 1844. A very pretty species, with remarkably curious flowers. (B. M. 5214.)

O. plagianthum (athwart-flowered). *fl.* brown, with oblong sepals and petals; lip triangular. A curious species.

O. planilabre (flat-lipped). *fl.* yellow; sepals and petals lanceolate, acuminate, wavy, nearly equal; middle segment of lip semicircular, flat; crest rhomboid, cuspidate; raceme simple. Autumn. *l.* ensate. Pseudo-bulbs two-edged, slender, ribbed. *h.* 1½ft. Brazil, 1848. (J. H. S. vi. 5.)

O. plicigerum (fold-bearing). *fl.* brown, small, disposed in short, branched panicles; lip purplish-brown at the base. Ecuador, 1873.

O. porrigens (extending). *fl.* chestnut-brown, with honey-coloured tips; lip cinnamon colour, with an orange callosity, and some deeper spots. New Grenada, 1868.

O. præstans (excelling). A hybrid, probably between *O. dasystyle* and some species like *O. Gardneri.* It is superior to the first, has brighter colours, but lacks the blackish border of the basilar portion of the lip, and it resembles the last in the system of calli.

O. prætextum (bordered).* *fl.* brown, the edges and bars of yellow, very fragrant; lip yellow, with margin of brown, broken with yellow blotches and lines. Brazil, 1876. A handsome species, of which the collector said: "The flowers are most elegantly placed in a very light and feathery-looking inflorescence, and have, at the same time, a heavenly smell."

O. pubes (downy). *fl.* yellow-brown, spotted, with a fiddle-shaped lip; panicle simple, many-flowered, sub-secund. Autumn. *l.* lanceolate. Pseudo-bulbs cylindrical, one-leaved. *h.* 1ft. Brazil, 1824. (B. M. 3926.) [C.]

O. p. flavescens (yellowish). A synonym of *O. cruciatum.*

O. pulchellum (neat). *fl.* white, tinged with yellow and pink, about 1in. across; panicles many-flowered, drooping, 1ft. long. Summer. Pseudo-bulbs and leaves small. *h.* 6in. West Indies. An elegant, dwarf-growing species, which thrives well on a block, if supplied with plenty of moisture at the roots. (B. M. 2773; B. R. 1787.) [T.]

O. pulvinatum (cushion-like). *fl.* yellow, orange, and brown; panicles sometimes 10ft. long. Summer. Brazil, 1836. A free-flowering, compact-growing plant, remaining a long time in perfection. (B. R. 1839, 42.) The variety *majus* is very desirable. [T.]

O. pumilum (dwarf). *fl.* yellow, numerously produced on short, dense, upright, branching panicles. Spring. *h.* 6in. Brazil, 1824. A rare and pretty species. (B. M. 3581; B. R. 920; L. B. C. 1732.) [T.]

O. pyxidophorum (box-bearing). *fl.* yellow, with a little box at the base of each lip, and with serrulated wings to the column. This plant is otherwise much like *O. cornigerum* and *O. pubes.*

FIG. 732. FLOWER OF ONCIDIUM SERRATUM.

O. reflexum (reflexed). *fl.*, sepals and petals regularly speckled with brown; lip with a few red specks at the base. Mexico. (R. X. O. i. 93, t. 36.)

O. r. pelicanum (pelican-beaked). *fl.*, sepals bright yellow, spotted with crimson near the base; lip with a rich crimson stain around the crest. Mexico. (B. R. 1847, 70, under name of *O. pelicanum.*)

O. Retemeyeranum (Retemeyer's). *fl.* pale yellow and chocolate-brown, with a deep violet lip, disposed in a raceme. *l.* oblong. Mexico, 1869. A small, almost bulbless orchid. (Ref. B. ii. 74.)

O. rostrans (beaked). *fl.* gay-coloured, disposed in dense clusters. Pseudo-bulbs pyriform. Columbia, 1875.

O. rotundatum (rounded). *fl.* brown, small, with yellowish tips to the sepals, petals, and lip, and the base of the lip yellow inflorescence 9ft. to 12ft. long, branched near the end. 1873.

O. rupestre (rock).* *fl.* brilliant golden-yellow, spotted with brown, very numerous, produced on a much-branched panicle 2ft. high and 1ft. wide. *l.* ligulate, about 1ft. long, dark green. Pseudo-bulbs smooth, stout, pale green. Peru. A very desirable plant.

O. Russellianum (Duke of Bedford's). A synonym of *Miltonia Russelliana.*

O. rusticum (rustic). *fl.* onion-green, with light brown blotches; lip pale yellow, with many brown bars, and an orange-coloured callus; panicle ample, zigzag. Ecuador, 1870.

Oncidium—*continued.*

O. saltabundum (dancer). *fl.* ochre, blotched with brown, small, short-lipped; inflorescence zigzag. New Grenada, 1883.

O. sarcodes (flesh-like).* *fl.* orange-yellow, profusely dotted and blotched with crimson; scape attaining a considerable length, bearing a much-branched panicle, of two, three, or more feet in length, and clothed with a profusion of large blossoms. Spring. *l.* twin, shining green, broad, obtuse. Pseudo-bulbs very dark green, tapering upwards from the base. Brazil. Habit very neat and compact for so large a plant. (W. S. O. 23.)

O. Schlimii (Schlim's). *fl.* bright yellow, with irregular bars of brown, about 1in. in diameter; panicle long, having short racemes along each side of the main stem. November. Central America. A tall, rambling species. [T.]

O. Semele (Semele). *fl.* yellow, smaller than those of *O. calanthum* (to which this species is allied), and having a few purplish streaks and blotches; lip broad, reniform. Ecuador, 1870. A handsome plant.

O. serratum (saw-tooth-petaled).* *fl.* usually of a rich bright brown, with a yellow border, and crisped or much-serrated margins; petals drawn together in such a way as to form an arch above the column; spike twining and branched, 6ft. to 12ft. long, bearing numerous large blossoms. *l.* twin, ensiform, 1ft. to 2ft. long. Pseudo-bulbs large, ovoid. Peru, 1850. SYN. *O. diadema*, of gardens. See Fig. 732. (B. M. 5632.)

O. sessile (stalkless). *fl.* large; sepals and petals broad, obtuse, of a golden-yellow, freckled with cinnamon-brown towards the base; lip broad, and similar in colour; scape bearing a much-branched raceme of numerous flowers. Spring. *l.* twin, pale green, short, strap-shaped. Pseudo-bulbs oblong, somewhat compressed, slightly ribbed. Caraccas, 1848. A compact-habited and free-growing plant. (L. & P. F. G. 21.) [T.]

O. sphacelatum majus (larger, scorched). *fl.* yellow, barred with dark brown, disposed on long, branching panicles, and remaining several weeks in perfection. Spring. Honduras, &c.

O. spilopterum (spotted-wing). A synonym of *O. Batemannianum spilopterum*.

O. splendidum (splendid).* *fl.* 2in. across; sepals and petals green, heavily barred with brown; lip large, of a rich bright golden-yellow; spike erect, branching, about 2ft. long. *l.* solitary, oblong, 4in. to 7in. long. Pseudo-bulbs 1in. high. Guatemala, 1862. One of the finest species in cultivation. (B. M. 5878, under name of *O. tigrinum splendidum*; F. d. S. 1825.)

O. stipitatum (stalked). *fl.* pale sulphur-yellow, with sepals and petals dotted with crimson, and a crimson stain below the crest; middle lobe of lip with a narrow isthmus, coarsely toothed and two-lobed, the lateral lobes falcate; wings of downy column half ovate, acute. Panama, 1844. (B. R. 1846, 27, under name of *O. lacerum*.)

O. s. platyonyx (broad-clawed). A variety having very numerous flowers, which are smaller than in the type; claw of lip broader, and, on each side of the anterior callus, a callus ridge. 1878.

O. stramineum (straw-coloured). *fl.* white, speckled with red on the lateral sepals, lip, and column, ¾in. across; sepals and petals widely spreading; lip very shortly clawed. *l.* 6in. to 8in. long, oblong-lanceolate, sub-acute. Pseudo-bulbs none. Mexico. (B. M. 6254; B. R. 1840, 14.)

O. Suttoni (Sutton's). A species of little interest, with very long, drooping, panicled racemes of dull yellow and brown flowers, and with narrow, grassy leaves. (L. & P. F. G. ii. 129.)

O. tectum (concealed). *fl.* yellow, spotted with rich maroon-brown, disposed in a zigzag panicle. *l.* narrow, linear-ligulate. Pseudo-bulbs pear-shaped, ancipitous. New Grenada, 1875.

O. teretifolium (terete-leaved). *fl.* bright yellow, small, in erect, many-flowered panicles. *l.* thickish, erect, terete. 1882. [T.]

O. tetracopis (four-bladed). *fl.*, sepals chestnut-brown, the superior one with a yellow border; petals bright yellow, with some brown, round blotches; panicle large. New Grenada, 1873.

O. tigrinum (tiger-striped).* *fl.* very large, having a Violet-like perfume; sepals and petals bright brown, transversely barred with deep yellow; lip very large, about 1½in. across, wholly rich deep yellow; panicles sometimes 3ft. in length. Winter. Mexico,

Oncidium—*continued.*

1840. A fine species, with a robust growth. (L. S. O. 48, under name of *O. Barkeri*.)

O. t. unguiculatum (claw-bearing). *fl.* yellow, large, produced on a branching spike, 3ft. to 4ft. in height, and remaining a long time in perfection. Winter. Mexico, 1846. A pretty species. (L. & P. F. G. ii. 134.)

O. tricuspidatum (three-cusped). *fl.*, sepals orange, with a brown mid-line; petals pale sulphur, with small brown spots and brown back; lip very shortly cuneate at base, with a large, oblong, two-lobed blade, sulphur, with bars at the base; peduncle panicled, longer than the leaves. Pseudo-bulbs narrow, one-leaved, and with a leaf at their base. Costa Rica, 1884.

O. trifurcatum (thrice-forked). *fl.*, borders of the reniform blade of sepals and petals light yellow, the latter free; lip crimson-lake, with light yellow calli; two sword-like blades stand under the stigma. Peru, 1884. Allied to *O. serratum*.

FIG. 733. FLOWERS OF ONCIDIUM VARICOSUM.

O. trilingue (three-tongued). *fl.*, sepals and petals rich chocolate-brown, edged with light yellow, the margins undulated lip; very singular in form, brown, with a yellow crest. Spring. Peru, 1850. A rare and very distinct species, closely allied to *O. serratum*. (L. & P. F. G. ii. 63.)

O. triquetrum (triangular-leaved). *fl.* greenish-white, spotted with dark purple, about 1in. across; raceme about twelve-flowered. Autumn. Jamaica, 1793. (B. M. 3393.) [T.]

O. trulliferum (trowel-lipped). *fl.* yellow, barred with brown spots. Autumn. Brazil, 1838. A small, and not very interesting species. (B. R. 1839, 57.)

O. unicorne (one-horned). *fl.* small; sepals green, lanceolate; petals narrow-obovate, yellow, blotched with rust-colour; lip three-lobed, yellow, blotched with red in the disk, the lateral lobes small and narrow, and the intermediate one transversely rhomboidal and notched at the apex; peduncle from the base of the pseudo-bulb, soon branching into a panicle. *l.* 5in. to 6in. long, oblong-lanceolate. Rio Janeiro, 1839. (B. M. 3890, under name of *O. monoceras*.) [C.]

O. u. pictum (painted). A pretty variety, with whitish sepals, and petals blotched with dark Indian purple; lip lemon-yellow, with dark brown blotches. 1880. [C.]

Oncidium—*continued.*

O. uniflorum (one-flowered). *fl.* pale brown, thinly spotted with reddish-purple; lip clear yellow, blotched and spotted round the crest; spikes short, one-flowered. Winter. *h.* 4in. Brazil, 1841. (B. R. 1843, 43.)

O. varicosum (varicose-veined).* *fl.*, sepals and petals pale dull green, banded with dull brown; lip bright yellow, large, with two ovate lateral ears, somewhat crenate in front, and a four-lobed middle lobe; crest of two triple teeth; scapes strong, glaucous, about 3ft. long, having a large, branching, eighty to ninety-flowered panicle. *l.* firm, ligulate-lanceolate. A beautiful, strong-growing species. Brazil. See Fig. 733. (L. J. F. 206, 207.)

O. v. Rogersii (Rogers').* *fl.* rich golden-yellow, 2in. or more in diameter; sepals and petals comparatively inconspicuous, the great attraction being the large flat lip, which is lobed in front; panicle much branched, and bearing, in a well-grown example, as many as 170 blossoms. Winter. *l.* somewhat short, dark green. Pseudo-bulbs large, ovate, deep green. Brazil, 1869. This is a rare variety, and, at the same time, one of the most beautiful. It will succeed on a block of wood, or in a pot or basket; the last is, perhaps, the most convenient plan for displaying its large, many-flowered panicles, and, at the same time, it insures perfect drainage. (B. H. 1878, 172; G. C. 1870, 277.)

O. variegatum (variegated). *fl.* pink, richly stained with cinnamon-red, about 1in. across; panicles branching, 1½ft. high, erect. Summer. *l.* dark green. *h.* 6in. West Indies, 1824. A pretty species. (L. & P. F. G. 33.) [T.]

O. vernixium (varnished). *fl.* disposed in a thyrsoid panicle; sepals and petals cinnamon-colour, with yellowish borders, oblong, crisped; lip yellow, remarkable for its retuse, retrorse, basal auricles, the reniform apex yellow, and the disk shining brown, with a very curious callus. Ecuador, 1870. An interesting and distinct species.

O. virgulatum (twiggy). A very curious species, with heteromorphous flowers, and very short, numerous, zigzag branches. Columbia, 1876. Of no ornamental value.

O. Warscewiczii (Warscewicz's).* *fl.* golden-yellow, numerous, disposed in racemes; lip having a white, five-toothed callosity, with four brown spots, and both borders of its narrow part being tinted with brown. *l.* cuneate-ligulate. Pseudo-bulbs ovoid, compressed, two-leaved. Costa Rica, 1870. SYN. *O. bifrons.* [C.]

O. Weltoni. *See* **Miltonia Warscewiczii.**

O. Wentworthianum (Earl Fitzwilliam's).* *fl.* pale lemon, barred towards the base of sepals, petals, and lip with Vandyke brown; lobes of lip large; panicles many-flowered, remaining in beauty about two months. Summer. *l.* linear, lanceolate, of a lustrous hue. Pseudo-bulbs oblong, ovate, pale green, mottled and barred with black. Guatemala, 1839. (L. & P. F. G. ii. 127.) [C.]

O. xanthodon (yellow-toothed). *fl.* very dark chocolate, with a very thin yellowish limb around both sepals and petals; lip dark brown, with a shining yellow crest and a yellow apex; spike very long, trailing, branched. Winter. *l.* long, linear-obovate, acute. Pseudo-bulbs narrow, ovoid, smooth, compressed, 5in. long. *h.* 2ft. Ecuador, 1868. (B. M. 5756.)

O. zebrinum (zebra-marked). *fl.* white, transversely barred with reddish-violet stripes; lip yellow; racemes very long, from 6ft. and upwards in length. Venezuela, 1872. A pretty species. (B. M. 6138; I. H. 274.)

ONCOCYCLUS. Included under **Iris** (which *see*).

ONCOSPERMA (from *onkos*, a tumour, and *sperma*, a seed; in reference to the form of the seeds). SYN. *Keppleria.* ORD. *Palmeæ.* A genus comprising five or six species of spiny, stolon-bearing, stove palms, natives of tropical Asia. Flowers unisexual, usually in threes; spadix shortly pedunculate; spathes two. Fruit small, round, one-seeded. Leaves terminal, equally pinnatisect, with very spiny, sheathing footstalks; segments ensiform, acuminate, entire. Trunks slender, spiny, marked with circular scars. The species thrive best in a compost of two parts loam, one of peat, and one of sand. They require a copious supply of water. Propagated by seeds, or by suckers. The species here described are probably the only ones yet introduced.

O. fasciculatum (fascicled). *l.* dark green, pinnate; pinnæ long, somewhat pendent; petioles sheathing, clothed with slender black spines. Ceylon. An elegant species.

O. filamentosum (thready). *l.* pinnate, from 10ft. to 12ft. long; pinnæ very numerous, narrow, drooping, about 2ft. long. *h.* 40ft. to 50ft. Malacca, &c. SYNS. *Areca Nibung* and *A. tigrillaria.*

O. Van Houtteanum (Van Houtte's). A synonym of *Nephrosperma Van Houtteanum.*

ONION (*Allium Cepa*). There are few vegetable crops of greater importance, or more in daily request, than that of the Onion. It is a native of Central Asia, &c. Until

Onion—*continued.*

recently (comparatively speaking), the origin of the plant was unknown. It is a hardy biennial, as, although the leaves and roots are only of annual duration, the bulb formed in the summer, after being kept for a greater or less time, according as the different varieties admit, has the power of renewing its growth by forming fresh roots and leaves, and producing its flowers and seeds; afterwards, it dies away. Onions have been cultivated from the most remote period, throughout an extremely wide geographical area. Their uses are well and universally known, both in the green young state, and also, more especially, when the bulbs are matured. Much variation exists in the shape and flavour of bulbs belonging to different varieties; some being very mild and succulent, while others are pungent, almost, at times, to an intense degree. An Onion bulb is composed of a series of concentric coats, which surround its growing point, and vary in colour from dark red almost to white, the flavour being generally much stronger in the red than in the white-fleshed varieties. Propagation of the several sorts is readily effected by seeds, which, however, soon degenerate if care is not taken; in some cases, also, offsets are produced, and may be utilised as a method of increase.

CULTIVATION. One of the best and most open situations in the kitchen garden should be assigned to Onions, as such a position is indispensable for their successful cultivation. They succeed best in a rich, loamy soil, somewhat light rather than heavy, and where the subsoil is of a fairly dry nature. The suitability of a light or a heavy soil, however, depends a good deal on whether the summer is a wet or a dry one; and indifferent soils may be much improved by the addition of suitable manures, and by a system of intercropping, or changing of ground, so that different vegetables are not grown, if it can be avoided, in the same division of the garden two years in succession. For instance, Onions sown in spring could scarcely be better suited, as to position and soil, than by land occupied the previous year with Celery; autumn-sown ones might follow Potatoes, Peas, Beans, or any of the *Brassica* tribe; and thus a change of crop would be effected. Especially should this change be allowed in the case of Onions, when the produce becomes cankered in any one situation, or the plants are attacked by the destructive maggot of the Onion Fly. Land intended for Onions should be well-trenched in the autumn, and left in ridges for the winter fully exposed to the weather, which will wonderfully ameliorate and improve that of a firm texture, or heavy and adhesive nature, before the seed-sowing time arrives. Where a crop of Celery has been grown, trenching will scarcely be necessary; the deep digging and manuring requisite for Celery culture being sufficient to intermix and change the position of nearly the whole of the soil. A good dressing of manure should be applied at trenching time, or dug in at the same season, if trenching is unnecessary. A few words on the best manures. The scrapings obtained from poultry yards, or from pigeon-houses, have long been considered as excellent manures for adding to land intended for Onions. Sheep-dung and pig-dung, where either can be obtained, are also powerful and good. Mixed farmyard manure may be used in large quantities for a preceding crop, or else it should be well dug in during the autumn. Guano or blood should be mixed in a compost, if either are used; or the latter may be added to water, and applied in weak solutions as a liquid manure. Charred rubbish, wood ashes, and charcoal are beneficial in several ways; salt and soot are also excellent to sow with the seed, as, besides acting as a manure, they prevent, to a great extent, the attacks of insects.

Spring-sown Onions. Land exposed in ridges throughout the winter will be in excellent condition for levelling down about the middle or end of February, supposing

Onion—*continued.*

the weather is fine; it should not, however, be worked when in a wet state. The whole surface is best if lightly dug over with a spade or fork, and the soil thoroughly broken and levelled, so that raking will be unnecessary for securing a fairly uniform surface. If the soil is as dry as it should be, and moderately light, it may then be well trodden or rolled previous to preparing drills for the seed. Onions succeed and form the best bulbs on firm ground, and the seeds should be but lightly covered. A custom which was at one time in general practice, namely, that of sowing them in narrow beds, and cutting alleys between, is, apparently, fast becoming obsolete, and the crop cultivated in an open quarter instead. Shallow drills should be drawn 1ft. apart, and of as near as possible an even depth, the seeds scattered thinly along them, and lightly covered. The whole surface may then be trodden over again, in a direction at right angles to the lines of seed; or rough stones, &c., may be removed carefully with a wooden rake, and the bed afterwards rolled. Divisions may readily be made, if they are desired, and beds of any size formed, by omitting to sow a line at each of the given distances of so many feet width. It is important that the foregoing operations should only be performed in fine weather, and when the soil is in a workable condition. The principal crop of Onion seed should be sown as early as possible in the month of March, as various circumstances and the weather permit; but, if frost, snow, or heavy rains prevail, it is best to defer the operation till the middle of the month. The after-treatment will chiefly consist in keeping weeds removed, and in thinning out the Onions gradually, when large enough, until they are from 3in. to 6in. apart; if extra-sized specimens are desired, a greater distance should be allowed at the final thinning. Deep hoeing, so beneficial to most kitchen garden crops, is not so to Onions, as the object with these is to keep the ground solid, so that the bulbs may be the more enlarged on its surface than they would be likely to become if surrounded with soil. Narrow hoes may be lightly used between the rows; but hand-weeding is best in the lines, and thinning of the crop should also preferably be done by hand. In very dry seasons, watering is at times advisable; but it should never be practised when the plants show signs of forming thick necks instead of their proper bulbs. The system of sowing in drills 1ft. apart has many advantages over the old method of scattering the seeds broadcast, as sufficient space is thereby afforded the plants on either side, and weeding, thinning, and all other necessary attention are much more readily bestowed. A little soot, applied thinly over an Onion bed with the hand in showery weather, is of material help to the crop when growing; to use it in dry weather would be unsafe, on account of its burning properties. Towards the latter part of summer, when the tops begin to bend down and show signs of dying away, it is time to pull up the bulbs. For this operation, advantage should be taken of dry weather, and the bulbs laid with their bases towards the sun, on a hard surface if possible, where they can be turned over occasionally and thoroughly dried before being stored. Different varieties are best kept and stored separate from each other, as their keeping qualities vary considerably. Those calculated to keep longest should especially be thoroughly ripened and dried. They are best tied up in bunches, and suspended to the rafters of a cool, dry, shed or loft where frost is merely excluded. If placed in a position exposed to heat, to much moisture, or even hung against the walls of a shed, new growth would be encouraged, and the bulbs would soon be useless in consequence. Where a large quantity of Onions are grown, and time cannot be spared for tying them up, they may be stored, several bulbs deep, in a similar place to that above recommended, and be encased with a covering of

Onion—*continued.*

clean, dry straw. Long-keeping varieties thus treated are sometimes preserved in good condition until late in spring.

Autumn-sown Onions. Onions may be sown in autumn for two purposes: first, for pickling or for drawing as required for use in spring; and, secondly, for the purpose of transplanting at the latter season. Spring-sown bulbs grow to a large size, under good cultivation, by the autumn; after they have been allowed a resting season, instead of further enlarging, they invariably tend to produce a flower-stem. But if seeds of a large-growing, early sort are sown thickly towards the latter part of summer, so that time is only allowed them to form very small bulbs, these may be stored and replanted in March, with the result that a large proportion, at least, will enlarge so as to form finer specimens the following year than could be secured in a similar soil and position, in one season from spring-sown seeds. Again, earlier and finer produce may be obtained by sowing in August or early in September, and transplanting in the new year so soon as weather permits. All varieties are about as hardy as each other; none are secure against a very severe winter, without being sown in a warm position or provided with some protection. The Tripoli or Italian Onions require a long season to ripen perfectly, and are, consequently, best sown in autumn; White or Silver-skinned varieties are also valuable for autumn sowing, as, under such treatment, they form useful bulbs early the following season. Any of the varieties that succeed well, when spring-sown, may also be considered equally good for autumn sowing. The ground should be prepared in a manner somewhat similar to that already detailed, but the seed drills should be made rather deeper, to guard against frost lifting out the plants in winter. In the process of transplanting, the roots should be preserved as much as possible. On a small scale, little trenches may be made, and the roots only inserted, leaving the plant above the surface; but where large quantities have to be transplanted, the dibber must be brought into requisition. A greater or less proportion of any autumn-sown Onions invariably run to seed, as might be expected from their natural habit of flowering the year after being sown. Spanish Onions, so largely imported into, and highly esteemed in, this country, are cultivated chiefly from seeds, sown thinly, in a warm situation, about November, protected with mats, &c., afterwards, and transplanted into rich soil about April. These varieties deteriorate under cultivation in this country, probably from being insufficiently hardy to withstand our climate.

Seed-sowing of Onions for Pickling. Silver-skinned varieties of Onion are preferred for pickling, on account of their flesh being nearly white, and of a better appearance than when coloured. Two-bladed—so named because of its peculiarity in only producing two blades or leaves—is a very small and an early variety most useful for pickling purposes. Seeds may be sown in early spring, and also in autumn, in a bed where the soil is poor rather than rich, the object being to get a large quantity of bulbs; the smaller they are, the better. The seeds should be scattered broadcast for pickling Onions, thickly, but, at the same time, as evenly as possible, and thinning-out will be unnecessary.

Seed-saving. Only specimens of a good shape and of large size, according to the variety, should be selected for seed-production. Varieties or forms soon deteriorate, if selection is not rigidly practised. Plant the bulbs in good soil, and in a sheltered position, early in February, and tie up the flower stalks as soon as they require support. When the seed vessels turn brown, and begin to burst, cut the heads, and dry them in the sun; or place in paper bags, and suspend them, head downwards,

Onion—*continued.*

from the roof of a dry, cool shed. The seeds keep fairly well for two years, but cannot be depended upon afterwards.

FUNGI. Onions, and their allies, Leeks, Chives, &c., are liable to be much injured by the growth on them of several kinds of parasitic Fungi, which belong to groups noted for the harm done by them to cultivated plants. Each group is described under the headings noted below; hence, we shall not give any full account of the species here, but shall refer our readers to those headings. All the Fungi bore into and through the tissues of the host-plants; hence, no external applications are of much use. The best thing to be done is, therefore, to remove and burn all the affected plants, in order to prevent the spread of the disease. The most hurtful species of Fungi on Onions are: (1) The Onion Brand (*Puccinia minta* = *P. Allii*), which produces yellow and brown patches of spores on the leaves and flower-stalks (*see* **Puccinia**); (2) the Onion Smut (*Urocystis cepulæ*), filling the bulbs with a black mass of spores (*see* **Urocystis**); (3) the Onion Mildew (*Peronospora Schleideniana*), which causes a whitish-grey bloom on all the young leaves, and fills all parts with its mycelium (*see* **Peronospora**); and (4) the Onion Mould (*Mucor subtilissimus*), which penetrates the tissues at the top of the bulb, and also of the bulb itself, and forms in them multitudes of small black bodies (sclerotia) like grains of gunpowder. These emit mycelial tubes in moisture; and, when the tubes reach the air, the branches form, at their tips, small bladders (sporangia), full of spores, which are set free by the bursting of the bladders.

SORTS. There are over twenty sorts of Onions which may be considered distinct, and forms of one or another of these are in some cases named as new kinds almost indefinitely. The majority answer equally well for sowing both in spring and autumn; but there are some that do not obtain a season sufficiently long to ripen them, unless sown in the autumn. Of these the Tripoli, or Italian, and Lisbon varieties are examples; the whole of the Silver-skinned section (except for pickling purposes), may also be sown in autumn with good results, as they form bulbs so early the following spring. Spring-sown Onions are, generally speaking, the most important as a crop, and the majority of cultivators who have not to maintain a continuous supply, limit their operations to the one season's growth. Produce of medium size, so long as it is solid and thoroughly ripened before being stored, is, as a rule, more useful for ordinary purposes than large specimens; size and shape are, however, most important conditions where exhibiting is practised.

Brown Globe. Bulbs of medium size, somewhat globular, with high crown and dark or reddish-brown skins. An excellent keeping variety, and one which is much esteemed. MAGNUM BONUM is a good form of this.

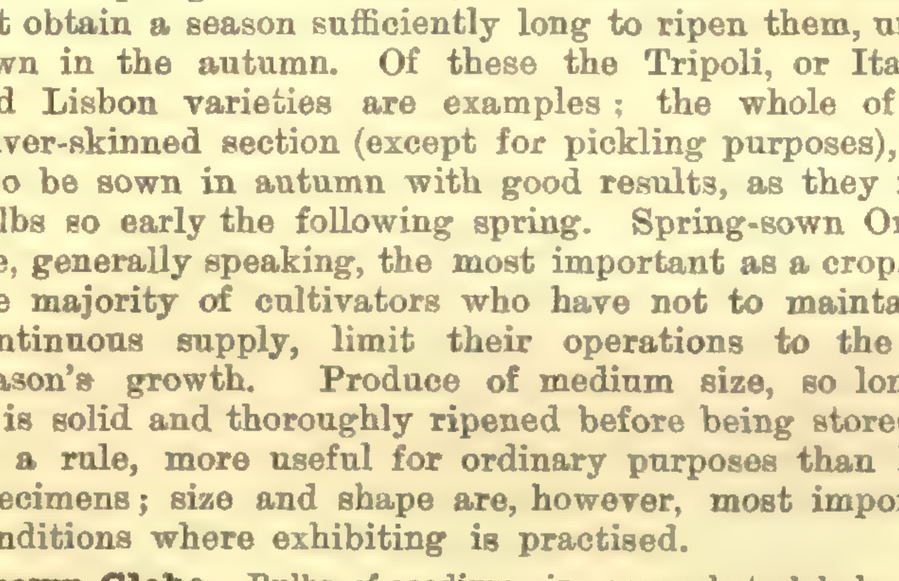


FIG. 734. DEEP BLOOD-RED ONIONS.

Deep Blood-red. Bulbs of medium size, or rather small, flattened, and generally of an even outline; the inner part is pure white, while the outer coats vary in colour from dull, to deep glossy, red. A very strong-flavoured, solid Onion, and an excellent keeper. See Fig. 734.

Onion—*continued.*

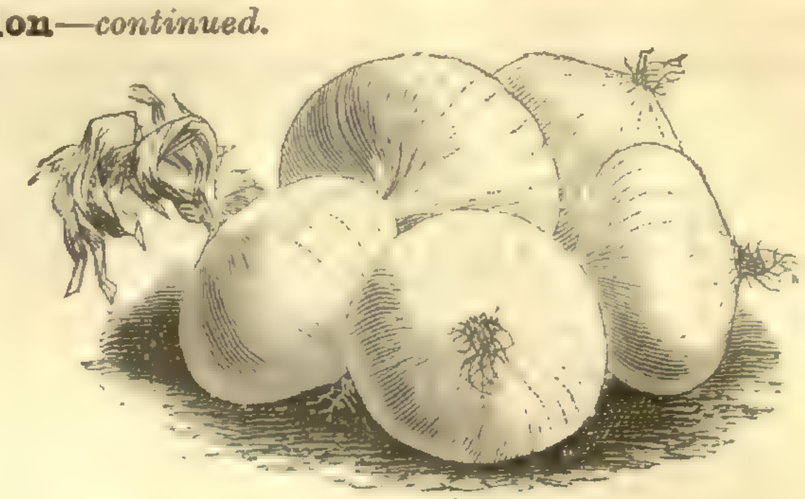


FIG. 735. EARLY WHITE NAPLES ONIONS.

Deptford. Bulbs medium, flattened or oblate, with a small neck; skin dark reddish-brown; flesh solid, tinged with red. A good keeping variety, of excellent quality; very hardy, and ripens early. SYN. Brown Spanish.

FIG. 736. JAMES'S KEEPING ONION.

Early White Naples. An early form of the Silver-skinned section, excellent for sowing in autumn, as it produces useful little bulbs early in spring. SYN. Early Nocera. See Fig. 735. PARIS SILVER-SKIN is very similar to this, but is somewhat later in forming bulbs. It does not keep long.

FIG. 737. NAPLES GIANT ROCCA ONION.

Flat Tripoli. Bulb large, roundish, with a thick neck; flesh reddish, soft, of mild and excellent quality, but soon decays after being stored. Should be sown in autumn.

Onion—*continued.*

Giant White Tripoli. Bulb large, flattened, with an irregular base; skin silvery-white; flesh greenish-white, of very mild flavour. Plant strong and robust, attaining a very large size, when sown in autumn and transplanted.

Globe Tripoli. Bulb globular, with a thick neck, very large; flesh white, mild, of excellent quality. Plant of strong growth. The varieties of Tripoli Onion are not good keepers, but are very useful in summer and early autumn.

James's Keeping. This is sometimes considered as a form or synonym of BROWN GLOBE. It is, however, well marked in most samples by being more of a pear-shape. One of the best and longest keeping varieties, and one much esteemed. See Fig. 736.

Lisbon. Bulb large, globular, with rather thick neck. Useful for spring salads, if sown in autumn, but not generally recommended.

Naples Giant Rocca. Bulb large, roundish, regular in outline; flesh white, thick, and of good quality. A desirable sort, of robust growth; ripens and keeps well. See Fig. 737.

FIG. 738. QUEEN ONIONS.

Queen. A small and very early variety of the Silver-skinned section, which forms bulbs very quickly, perhaps quicker than any other. Sown early in March, it is full grown by June; and it is also highly recommended for autumn sowing. The bulbs are small, but very firm and solid, and keep well; skin thin, silvery-white. The plant has rarely more than two or three leaves. SYN. Now Queen. See Fig. 738.

Silver-skin. Much like PARIS SILVER-SKIN, or EARLY WHITE NAPLES. The bulbs ripen and keep well into the winter. This variety and all in the section are most desirable, and of greatest use for pickling.

FIG. 739. TREBONS ONIONS.

Trebons. Bulbs very large, obovate, tapering to the stalk or neck; flesh pale and rather soft, but of mild and excellent quality. A first-rate Onion, of fine appearance, resembling very closely the imported Spanish variety. It is one of the best for autumn sowing, and succeeds most favourably in warm seasons. See Fig. 739.

Onion—*continued.*

Two-bladed. The true two-leaved type has small roundish bulbs of a dull yellowish-brown colour; they are about 1in. in diameter, firm, ripen early, and keep well. Much grown for pickling on account of its small size.

Wethersfield Red. Bulbs large, flattened, or oblate, of even and regular outline; outer skin dull red or purplish; inner flesh pure white. A handsome American variety—perhaps the best of all the red Onions—of excellent quality, and good keeping properties.

FIG. 740. WHITE SPANISH ONIONS.

White Globe. Bulbs of medium size, globular or obovate, with a high crown. A much-esteemed, and good-keeping sort, similar in many respects to WHITE SPANISH, but of a different shape.

FIG. 741. YELLOW DANVERS ONION.

White Spanish. Bulbs large, flattened, base broad, and sometimes a little hollow and uneven; skin pale straw-colour, and falls off readily; flesh solid, almost white, and of first-rate quality. This is the type of Onion most largely cultivated. It generally keeps in good condition up till late in spring. See Fig. 740. Of the numerous forms, the following are recommended as being the best: ANGLO WHITE SPANISH, BANBURY, NUNEHAM PARK, READING, and ROUSHAM PARK HERO.

Onion—*continued.*

Yellow Danvers. Bulbs of medium size, with small base and fine slender neck; flesh very firm throughout, of fine quality. A fine and distinct variety, which ripens off freely and keeps well. See Fig. 741.

The following are varieties of Onion that are distinct in habit from those already enumerated. They are useful to grow in small quantities, as sometimes they come in when others are not procurable.

Egyptian, Tree, or Bulb-bearing Onion (GARDEN ROCAMBOLE). This throws up a stem from the bulb, which has to be planted, and produces a number of small bulbules, about the size of marbles, on the top, that are excellent for pickling. Offset bulbs are also formed underground; and from these, and the other small ones produced on the stem, the variety is propagated.

Perennial Tree or Top Onion. This is somewhat similar to the EGYPTIAN, but the bulbules are smaller, and none are produced underground. The plant is perennial, and has long, fibrous roots.

Potato or Underground Onion. A variety cultivated something like Shallots. Small bulbs are planted singly, and around them new ones are formed. They are of irregular shape, of fair quality, and useful for an early supply. This variety is not propagated from seeds.

Welsh Onion. This is a herbaceous perennial, with long, fibrous roots; it forms no bulbs. There are two varieties, the Red and the Green, cultivated for the use of their tops, or leaves. Propagated by seeds, or by division of the roots.

ONION FLY (*Anthomyia Phorbia ceparum*). This insect is at times most hurtful to Onions, the larvæ burrowing into, and eating, the bulb scales, near the base, in companies of from two or three to one hundred, or even more. These attacks are very serious in some localities, the greater part of the crop being often severely injured. The bases of the thick leaf-scales rot, and the plants are easily pulled up, leaving the decaying bulb and the maggots in the soil.

The flies are not unlike common house-flies in general appearance. They are of a blackish colour, thickly powdered with grey; the sides of the thorax are pale, and there are three dark lines on the back. In certain lights, the abdomen has a whitish lustre on it, with, in the male, a darker median stripe. The eyes are separated, in the

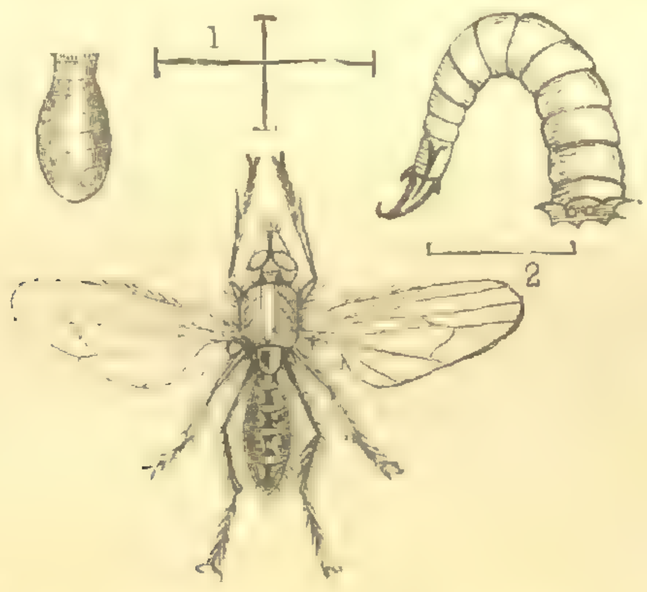


FIG. 742. ONION FLY, LARVA, AND PUPA.

1, Lines showing Natural Spread of Wings and Length of Body of the Fly; 2, Line showing Natural Length of Larva.

male, by a slender, black, white-bordered line; the face has a pale lustre, and the forehead is black, as are the antennæ and palpi; the legs are pitch black, the wings being pale grey, and the poisers white. The length of the insect is about ¼in. In the female, the forehead is broad, with a reddish-brown, vertical median stripe, and the body is more ochreous in colour than in the male.

Life History. The flies emerge, in early summer, from the brown pupæ, which have remained all winter underground, sometimes in the Onion, but usually near it in the soil. The female generally lays her eggs, five or six on each plant, on the leaves, just above the soil; and from these emerge larvæ, which bore downwards in the soil, and into the leaf bases, causing the whole Onion ultimately to rot under their attacks. They are nearly

Onion Fly—*continued.*

white, with yellow stigmas, smooth and shining, tapering (but headless) in front, and blunt behind. When full-fed, they burrow into the soil, and there become changed into chestnut-brown wrinkled pupæ. The fly, larva, and pupa, are shown in Fig. 742, and a diseased bulb in

FIG. 743. SECTION OF ONION ATTACKED BY LARVÆ OF ONION FLY.

a, *a*, Groups of Eggs and Young Larvæ; *b*, Hole made by Larva in Entering the Bulb; *c*, Direction of Course followed by Newly-hatched Larva to reach Base of Bulb; *d*, Burrow of Larva, in Bulb, with Larva lying in it.

Fig. 743. The entire development occupies from four to six weeks, so that several broods may appear in a summer. The first sign of attack by the larvæ is that the outer leaves become yellow, and fall, withered. The habitat in the bulbs protects the larvæ from injury, and from direct means of destroying them, unless the Onions are destroyed.

Remedies. Prevention is better than cure; and, for the safety of future crops, it is well to dig up and remove any plants that show signs of turning yellow, especially where the flies have been observed. The diseased bulbs should be dug out carefully; and they, and any larvæ that creep out, should be destroyed. If this is done sufficiently early, all the larvæ should be got rid of; but if deferred, they will have left the bulbs, and have turned into pupæ in the soil, in which situation they are less easily reached. Deep trenching of the soil in autumn is of use to destroy the pupæ, and farmyard manure, dug in during the operation, strengthens the plants. Applications of soot or gypsum, and of gas-lime, to the soil have been found useful; as have also soapsuds, and water from pigstyes, and, best of all, the use of paraffin oil, in the proportion of about 1oz. or 2oz. to a gallon of water. Sulphuric acid has been recommended, but is hardly suitable, as it is dangerous to the plants. Scattering the plants in small groups among other crops hinders the passage of larvæ from plant to plant.

ONISCIDÆ. A family of *Crustacea*, popularly known as Woodlice, or Slaters. The *Crustacea* include a large number of animals, which, like insects, have the body jointed, or forming rings of hard substance, to protect

Oniscidæ—*continued.*

the soft internal organs; these rings are united by soft membranes, to permit of the motion of one ring or another. They resemble insects considerably in the structure of the mouth, antennæ, and limbs; but they are readily distinguished from insects by possessing more than three pairs of true jointed legs, and by breathing by gills instead of by air-tubes. They never have a trace of wings; and their general appearance is an easy means of recognising them. They have two pairs of antennæ, though, in *Oniscidæ*, one pair is hardly to be seen. Their course of development also, and the changes passed through, are different from those undergone by insects. The class *Crustacea* includes a number of families of very different appearance, size, and habits; but most of its members live in water, and those which live out of water prefer moist situations, such as among dead leaves and other decaying matter, and conceal themselves, accordingly, during the day, in holes, from which they emerge, to feed, at night. The larger *Crustacea*, or *Podophthalma*, have their eyes supported on stalks. To this series belong crabs, lobsters, shrimps, and allied forms. By far the greater number of species of *Crustacea*, however, are small, with the eyes sessile, *i.e.*, upon the surface of the head, not on footstalks. The individuals of several of the groups in this series are microscopic in size; but two groups contain species of ½in. and upwards in length, having the head and segments of the body all distinct, with the body segments all alike in general form and possessing fourteen pairs of legs. Of these two groups, one, called *Amphipoda*, has the front pairs of legs different from the hinder ones The other group, called *Isopoda* (meaning equal feet), has the legs all similar, and possesses certain appendages at the hinder end of the body connected with breathing. To this group belong the *Oniscidæ*.

The *Oniscidæ* are distinguished from the remaining *Isopoda* by their habit of living in damp air instead of in water; by the organs for breathing being modified into functional lungs, instead of being fitted to obtain oxygen from water; and by having only one pair of antennæ well developed, and the legs fitted only for walking or crawling. They are mostly oblong or oval in general outline, and much depressed, with broad, short segments on the back, nearly hiding the rather short legs; but the antennæ are distinctly seen, projecting from the sides of the head. The females carry the eggs and young, for a time, in a kind of pouch on the lower surface of the body. The young differ from the old animals only in the smaller number of body rings and legs. The *Oniscidæ* are mostly sluggish, and live, during the day, in holes or other places of concealment. In colour, they are usually greyish-brown or dark slaty-blue, sometimes spotted with yellowish or buff markings on the back. They are common in damp, dark places, *e.g.*, under stones and dead leaves, in holes in walls or trees, in flower-pots, in cellars, &c., frequently crowded together in large numbers. They feed on plants, usually preferring decayed parts, but often do injury to delicate flowers (*e.g.*, Orchids), and frequently eat down seedlings, or destroy plants that spread their leaves on the soil, by eating into the part where root and stem meet. They are injurious to fruit-trees growing on walls, by eating into the ripe fruit that can be reached from the wall; and, in like manner, they eat into fallen fruits. It may be observed, that they are the only *Crustacea* at all hurtful in gardens. The most troublesome species are three, nearly the same size, viz., about ¾in. long on an average. These three are *Oniscus asellus*, with eight-jointed antennæ, back nearly smooth, light greyish-brown or leaden-blue, with two rows of yellowish or buff spots near the sides, and others scattered over the middle space of the back; *Porcellio scaber*, with seven-jointed antennæ, back covered with

Oniscidæ—*continued.*

round, raised tubercles, dark grey or slaty-blue, and often spotted as in the last but varying considerably in colour; and *Armadillo vulgaris*, easily known by its form being longer, and more convex, with the sides nearly parallel; by the absence of projecting appendages at the tail; by its seven-jointed antennæ, and uniformly dark leaden colour; but, above all, by its habit of rolling itself up into a ball when alarmed. This habit has gained for it the name of Pill Millipede, and, probably, was the ground on which it was, in past times, employed as a medicine, to be swallowed as a pill. It was much praised as an effective remedy in a number of ailments, but has fallen out of repute. *Oniscus asellus* was also at one time used as a remedy for ague, consumption, and other diseases; but it also has been discarded.

Prevention. All holes and coverts ought to be to the utmost got rid of, to prevent the Woodlice from finding shelter in the neighbourhood of the plants that have to be protected. Further security may be obtained by putting the pots on stands in water, or suspending them; or, in some cases, by covering them with glass. Trees may be protected by closing all holes in walls, removing loose plaster, and putting a strip of tar, or other adhesive substance, along the base of the wall, and on the trunks of the trees.

Remedies. When plants are injured, the cause should be sought for, and the animals destroyed. Traps may be used successfully, such as slices of fruits or fleshy vegetables, laid in favourite retreats; or hollow stems, and other shelters, placed in the localities frequented by such animals. Such traps should be examined from time to time, and the Woodlice found therein destroyed by being crushed, or dropped into boiling water.

ONISCUS. *See* **Oniscidæ.**

ONOBROMA, of De Candolle. Included under *Carthamus.*

ONOBROMA, of Gaertner. A synonym of *Carduncellus.*

ONOBRYCHIS (the old Greek name used by Dioscorides, derived from *onos*, the ass, and *brycho*, to bray; said to be the favourite food of the ass, who brayed in his eagerness to get at it). Saintfoin. ORD. *Leguminosæ.* A rather large genus of greenhouse or hardy, unarmed herbs or sub-shrubs, or rarely very spiny small shrubs. Upwards of seventy species have been described, not more than fifty of which are really distinct as such; they inhabit Europe, North Africa, and extra-tropical, mostly Western, Asia. Flowers purplish, pink, or white, disposed in axillary pedunculate spikes or racemes. Pods compressed, semi-orbiculate or orbiculate-circinate. Leaves impari-pinnate; leaflets entire, exstipellate. The plants are of easy culture in a deep sandy-loam soil. Seeds should be sown, in spring, in their permanent quarters. The only species calling for mention here are the following; they are hardy perennial herbs.

O. Caput-galli (cock's-head). *fl.* flesh-colour, in few-flowered spikes. July. Pod slightly pubescent. *l.* oblong or cuneate-obovate, mucronate, pubescent. Stem erect or diffuse. *h.* 1½ft. South Europe, 1731. (S. F. G. 723, under name of *Hedysarum Caput-galli.*)

O. radiata (rayed). *fl.* yellowish-white, lined with red, and spotted with yellow on the standard; calyx (and pod) villous; spikes cylindrical. June. *l.* ovate, obtuse, mucronate, hairy beneath. Stem erect, softly hispid. *h.* 1½ft. Iberia, 1818. (B. R. 1847, 37.)

O. sativa (cultivated). Common Saintfoin. *fl.* variegated, on elongated spikes. Summer. Pod pubescent. *l.*, leaflets elliptic-oblong, mucronate. Stem erect. *h.* 2ft. to 3ft. West and South Europe (Britain), North Asia. (J. F. A. 352; Sy. En. B. 381.)

O. s. montana (mountain). *fl.* purplish-rose, on short spikes; keel longer than the vexillum. Summer. Pod denticulate at back. *l.* cuneate-lanceolate, mucronulate. Alps of Europe, 1817. A very pretty and rather decumbent-growing rock plant.

ONOCLEA (changed from the Greek name of a plant, *Onokleion*, or from *onos*, a vessel, and *kleio*, to close; alluding to the singularly rolled-up fructification). Including *Struthiopteris*. ORD. *Filices*. A small genus (three species) of hardy ferns, inhabiting cold and temperate regions. Sori dorsal, globose, on the veins of the changed and contracted pinnæ of the fertile fronds, and quite concealed by their revolute margins; involucre very thin, delicate-membranous, hemispherical or half cup-shaped, originating from the inferior side of the sorus, or wanting. The species thrive best in a good, strong, loamy soil, and are very suitable for the outdoor fernery. For general culture, *see* **Ferns.**

O. germanica (German).* Ostrich Fern. *fronds* broad-lanceolate, long-attenuated at the base; fertile pinnæ short, much contracted, linear-terete, torulose, lobed and torn at the margin; involucre cup-shaped, very fragile, and soon obsolete. Northern hemisphere. A handsome species. SYNS. *Struthiopteris germanica, S. pennsylvanica.*

O. orientalis (Eastern). *fronds* ovate-oblong, not attenuated at the base; fertile ones oblong, often 2ft. long, contracted; pinnæ linear-oblong, flattened, two-edged, the broad, refracted margins covering the whole back, dark purple-brown, glossy, at length spreading, torn at the margin. Sikkim, Japan. SYN. *Struthiopteris orientalis.*

O. sensibilis (sensitive).* Rootstock extensively creeping. *fertile fronds* bipinnate; pinnules recurvate, globose. *sterile fronds* rising separately from the naked rootstock, long-stalked, broadly triangular in outline, deeply pinnatifid into lanceolateo-blong pinnæ, which are entire or wavy-toothed; involucre a globose pellicle, bursting at the summit. North America, North Asia, 1799.

O. s. obtusilobata (obtuse-lobed). A rare abnormal form, in which the pinnæ of some of the sterile fronds, becoming again pinnatifid, and more or less contracted, bear some fruit-dots without being much revolute, or losing their foliaceous character. Pennsylvania.

ONONIS (the old Greek name used by Theophrastus). Rest Harrow. ORD. *Leguminosæ*. An extensive genus (about sixty species) of glabrous, pubescent, or villous, greenhouse or hardy, annual, biennial, or perennial herbs, sub-shrubs, or rarely shrubs, inhabiting Europe, Western Asia, and North Africa, and extending to the Canary Islands. In the British Flora, the genus is represented by the variable *O. spinosa*, an under-shrub, and *O. reclinata*, a low-growing annual. Flowers pink, yellow, or white, in axillary, solitary, or two or three-flowered, racemose peduncles, or sessile. Pod oblong or linear, two-valved. Leaves usually pinnately trifoliolate; stipules adnate to the petioles. Several species are of easy culture in any ordinary garden soil, and are very suitable subjects for growing on banks and rockwork. Propagated by seeds, or by divisions. The species here described are those best known to cultivation.

O. arragonensis (Arragon).* *fl.* yellow, almost sessile, twin, disposed in a leafless raceme; calyx half as long as the corolla. May to July. *l.* trifoliolate, glabrous; leaflets roundish, serrated. *h.* 1ft. to 2ft. Spain, Arragon, &c., 1816. Half-hardy shrub.

O. fruticosa (shrubby). *fl.* purple; peduncles three-flowered, disposed in a raceme. Summer. *l.* trifoliolate; leaflets sessile, smooth, lanceolate, shining, unequally serrated. *h.* 1ft. to 2ft. South-western Europe, 1680. A handsome, low-growing, hardy shrub. (B. M. 317.)

O. hispanica (Spanish). *fl.* yellow; pedicels one-flowered. July. *l.* trifoliolate; leaflets nearly round, undulate, toothed, clammy-pubescent; stipules spreading, deflexed. *h.* 1½ft. Spain, 1799. Half-hardy shrub. (B. M. 2450.)

O. minutissima (very small). *fl.* yellow, in leafy, aggregate spikes; corolla shorter than the calyx. June. *l.* trifoliolate; leaflets oblong, obovate-cuneate, serrated; stipules subulate, entire. *h.* 3in. South-west Europe, 1818. A somewhat tufted hardy biennial. (J. F. A. 240.)

Ononis—*continued.*

O. Natrix (goat-root).* *fl.* yellow, veined with red; pedicels one-flowered, each furnished with an awn. Summer. *l.* alternate, trifoliolate; leaflets oblong, serrated at the apex, the upper ones sometimes simple. *h.* 1½ft. to 2ft. South Europe, 1683. Hardy perennial herb, clothed with a clammy pubescence. (B. M. 329.)

O. peduncularis (peduncular). *fl.*, petals white, with pink margins; peduncles thrice as long as the leaves, slender, glandular-pubescent. April. *l.* simple, obovate, dentate, pubescent, patent or recurved. *h.* 1ft. Teneriffe, 1829. Tender perennial herb. (B. R. 1447.)

FIG. 744. ONONIS ROTUNDIFOLIA, showing Habit and detached Single Flower.

O. rotundifolia (round-leaved).* *fl.* rose; peduncles three-flowered, bractless. Summer. *l.* trifoliolate; leaflets obovate, roundish, toothed. *h.* 1ft. to 1½ft. South Europe, 1570. A very handsome and most desirable, somewhat shrubby, hardy species. See Fig. 744. (B. M. 335.)

O. viscosa (clammy). *fl.* yellow, the back of the standard striped with purple, numerously disposed in panicled spikes. Summer. *l.*, lower ones trifoliolate, upper ones simple. *h.* 1½ft. to 3ft. South Europe, 1759. A handsome, hardy annual. (S. F. G. 678.)

ONOPORDON (the old Greek name, said by Pliny to be derived from *onos*, an ass, and *pordon*, crepitus; on account of its effect upon the asses who eat it). Sometimes spelt *Onopordum*. Cotton Thistle. ORD. *Compositæ*. A genus comprising about a dozen species of hardy annual, biennial, or perennial herbs, sometimes tall and branched, with decurrent, winged stems, sometimes almost stemless. They are natives of Europe, North Africa, and Western Asia. Flower-heads purplish, violet, or white, large; involucre globose or broad; receptacle flat, fleshy; achenes glabrous. Leaves radical or alternate, pinnatifid or sinuate-toothed. Two or three species of this genus are grown for their stately habit, and large and showy flowers. They will generally thrive in almost any ordinary garden soil, and are more especially adapted for the rougher parts of the subtropical garden. Seeds should be sown, in moderately good and well-drained soil, in early spring.

O. Acanthium (Acanthium).* Common Cotton Thistle. *fl.-heads* purple, large; scales of the calyx subulate, spreading in every direction. July. *l.* oblong, inclining to ovate, woolly on both sides. Stem branched, woolly. *h.* 4ft. to 5ft. Europe (Britain), Siberia. A very handsome perennial, with a bold habit and vigorous growth. (F. D. 909; Sy. En. B. 680.)

O. arabicum (Arabian). *fl.-heads* purple. *l.* having both sides covered with a white down. Stem also woolly, slightly branching, erect. *h.* 8ft. South Europe, 1686. Biennial. (B. M. 3299.)

Onopordon—*continued.*

O. elongatum (elongated). A synonym of *O. illyricum.*

O. illyricum (Illyrian). *fl.-heads* purple. July. *l.* decurrent, narrow-oblong-lanceolate, spiny-toothed, uppermost ones very short. *h.* 6ft. South Europe, 1640. A fine biennial species, with the general appearance of *O. Acanthium*, but having greener, more deeply-cut, and more spiny leaves, stiffer stem, and a more branching habit. SYN. *O. elongatum.*

O. macracanthum (long-spined). *fl.-heads* purple; involucre somewhat tomentose. July. *l.* decurrent, narrow-oblong-lanceolate, acuminate, spiny-toothed, glabrous above, cobwebby beneath. Stem erect, branched at apex, cobwebby. *h.* 6ft. Barbary, 1798. Annual. (S. F. G. 832.)

ONOPORDUM. *See* **Onopordon.**

ONOSERIS (from *onos*, an ass, and *Seris*, Endive; a salad for asses). Including *Centroclinium* and *Chætachlæna.* ORD. *Compositæ.* A genus comprising about a dozen species of stove, greenhouse, or hardy, annual or perennial herbs, or shrubs, of variable habit, natives of the Andes or extra-tropical South America, one being Brazilian. Flower-heads purple, pink, or white, large, solitary or paniculate, on long peduncles or scapes; involucre hemispherical or turbinate; receptacle naked or pilose-fibrillose. Leaves radical or alternate, white-tomentose beneath. The species succeed in a light vegetable soil. Propagation is effected by means of seeds. Probably the species here described are the only ones yet introduced to cultivation.

O. adpressa (adpressed). *fl.-heads* large, fragrant; ray and disk similar to those of *O. reflexa.* June to December. *l.* numerous, spreading, reflexed, 3in. or more long, lanceolate, waved, and nearly entire, pure white and cottony beneath. Stem shrubby, 1ft. to 2ft. high; branches white, woolly. Peru, 1830. Stove shrub. (B. M. 3115, under name of *Centroclinium adpressum.*)

O. Drakeana (Drake's).* *fl.-heads* bright purple, long-stalked. *l.* cordate-ovate, petiolate, white-tomentose beneath. New Grenada, 1883. Greenhouse, shrubby perennial. (R. H. 1883, 180.)

O. reflexa (reflexed). *fl.-heads* large, handsome, fragrant; ray-florets nine to twelve, rose-purple, two-lipped, three-toothed; disk deep yellow, very prominent; peduncles solitary. Late autumn. *l.* spreading, 2in. to 3in. long, ovate-lanceolate, acute, coarsely toothed, gradually tapering to a petiole, woolly beneath. *h.* 1½ft. to 2ft. Peru, 1830. Stove annual. (B. M. 3114, under name of *Centroclinium reflexum.*)

ONOSMA (from *onos*, an ass, and *osme*, smell; said to be grateful to that animal). Golden Drop. Including *Maharanga.* ORD. *Borragineæ.* A rather large genus (about seventy species, of which, probably, not more than four have been introduced) of hardy, hairy or villous, annual, biennial, or perennial herbs, or sub-shrubs, inhabiting South Europe, North Africa, and West and Central Asia. Flowers yellow, rarely white or purplish, pedicellate or sub-sessile, in simple unilateral racemes or branched cymes; corolla tubular, five-lobed. Leaves alternate. The species thrive in a good deep soil, preferably sandy loam. *O. stellulatum*, and its variety *tauricum*, are the best; they should be grown in a well-drained, sunny part of the rockery. Of the perennial species, cuttings should be taken during summer; they may be rooted quickly, if placed in a close frame, and kept shaded for ten or twelve days; water should be given carefully, or the hairy leaves will rot off. The young stock should be well rooted and hardened off before the cold weather sets in. *O. echioides* requires similar treatment to the foregoing, but, being a biennial, it must be raised from seed each year. The annuals must be sown, in the open border, in April.

Onosma—*continued.*

O. echioides (Echium-like). *fl.* pale yellow, drooping, pedicellate, in terminal, conjugate racemes. May. *l.* spathulate-lanceolate; floral ones, or bracts, ovate-cordate. Stem much branched. *h.* 1ft. to 1½ft. South Europe, 1683. Tubercularly hispid or strigose, biennial herb. (S. F. G. 172.)

O. simplicissimum (very simple). *fl.* pale yellow, in few-flowered, terminal racemes; corolla ventricose, inflated at apex, three times as long as the calyx. April. *l.* sessile; linear, slightly acute, somewhat silky-canescent beneath. Stem erect, very simple. *h.* 1ft. Siberia, 1768. Perennial herb. (B. M. 2243.)

O. stellulatum (small star-like). *fl.*, corolla white, yellow, or citron colour, two or three times longer than the calyx. April. *l.* straight, linear-oblong, flat, or with revolute margins; radical and lower ones sub-spathulate, obtuse; upper ones lanceolate, acute, sometimes semi-amplexicaul. *h.* 6in. Macedonia, &c. 1819. Plant suffrutescent at base.

FIG. 745. ONOSMA STELLULATUM TAURICUM, showing Habit and detached Single Flower.

O. s. tauricum (Taurian).*. *fl.* yellow, about 1½in. long, disposed in branched, secund heads. Summer. *l.* linear-lanceolate, acute, hispid, with revolute edges. Stems branched. *h.* 6in. to 8in. Caucasus, 1801. Perennial. See Fig. 745. (B. M. 889.)

ONOSMODIUM (so called from its similarity to *Onosma*). SYNS. *Osmodium*, *Purshia* (of Sprengel). ORD. *Borragineæ.* A small genus (about six species) of hardy, erect, herbaceous perennials, closely allied to *Onosma*, natives of North America and Mexico. Flowers white, greenish, or yellowish, sub-sessile, in terminal, scorpioid cymes or racemes; corolla tubular, with five erect or connivent lobes. Leaves alternate. The two species here described are the only ones yet introduced. For culture, *see* **Onosma.**

O. carolinianum (Carolinian). *fl.* yellowish-white, nearly sessile; racemes short, revolute, terminal, drooping. Summer. *l.* ovate-lanceolate and oblong-lanceolate, acute. *h.* 1ft. United States, 1759.

O. virginianum (Virginian). *fl.* yellowish, often paniculate. Summer. *l.* narrowly oblong, or somewhat lanceolate, obtuse, three to five-ribbed. *h.* 1ft. United States, 1812. Plant clothed with short, appressed, bristly hairs.

ONYCHIUM (from *onyx*, *onychos*, a claw; referring to the shape of the lobes of the fronds). ORD. *Filices.* A small genus (four species) of very beautiful, stove or nearly hardy ferns, natives of Arabia, India, Cuba, Japan, &c. Sori placed upon a continuous linear receptacle, which connects the apices of several veins; involucre parallel with the margin of the segments,

Onychium—*continued.*

linear, opposite, pressed down over the sori, the edge nearly or quite reaching the midrib. Only two species have been introduced; both thrive in a compost of peat, loam, and sand. For general culture, *see* **Ferns.**

O. auratum (golden).* *sti.* 6in. to 12in. long, stout, erect, naked. *fronds* 1ft. or more long, 6in. broad, ovate, quadripinnatifid; lower pinnæ 4in. to 6in. long, sub-deltoid, erecto-patent; pinnules and segments numerous, usually deltoid; ultimate divisions of the sterile frond often obovate-cuneate, trifid at the apex, not more than one line long, coriaceous in texture; those of the fertile frond pod-like. Rachis and both surfaces naked; the membranous involucres and copious sori a rich golden-yellow. Himalayas. Stove.

O. capense (Cape). A garden synonym of *O. japonicum.*

O. japonicum (Japanese).* *sti.* 6in. to 12in. long, stout, erect, naked. *fronds* 1ft. or more long, 6in. broad, ovate, quadripinnatifid; lower pinnæ 4in. to 6in. long, lanceolate-deltoid; pinnules and segments numerous, usually deltoid, the copious, linear-mucronate, ultimate divisions one and a-half to two lines long, nearly uniform in the barren and fertile fronds. *sori* brown. Japan, China, &c. Greenhouse or nearly hardy. SYNS. *O. capense, O. lucidum.*

O. lucidum (shining). A synonym of *O. japonicum.*

OPAQUE. Dull; the reverse of shining. In botany, the term does not mean the reverse of transparent.

OPERA GIRLS. *See* **Mantisia saltatoria.**

OPERCULARIA (from *operculum*, a lid; referring to the shape of the calyx). ORD. *Rubiaceæ.* A genus comprising fourteen species of Australian greenhouse herbs or sub-shrubs, sometimes twining, glabrous or hispid-pilose, often fœtid. Flower-heads white, small, terminal, or rising from the forks of the branches, involucrate; peduncles erect or recurved. Leaves opposite, linear or oblong; stipules connate with the petioles. The species (of which two only are seen in cultivation) thrive in a compost of sandy loam, a little fibry peat, dried pieces of leaf mould, and a few pieces of charcoal. Propagation may be effected by seeds, sown in spring, on a mild hotbed; by cuttings of young shoots, several inches long; or by division, as growth commences.

O. aspera (rough). *fl.-heads* globular, compound, on short, recurved peduncles. June. *l.* shortly petiolate, ovate or lanceolate, scabrous above, glabrous or pubescent beneath, mostly ½in. to 1½in. long, variable. *h.* 1ft. 1790. Sub-shrub. SYN. *O. ocymifolia.*

O. hispida (hispid). *fl.-heads* on short, recurved peduncles, smaller than in *O. aspera.* July. *l.* petiolate, ovate or lanceolate, either very hirsute and scarcely scabrous, or very scabrous, mostly about ½in. long. *h.* 1ft. 1790. Sub-shrub.

O. ocymifolia (Basil-leaved). A synonym of *O. aspera.*

OPERCULATE. Covered with a lid.

OPHELIA. A synonym of **Swertia** (which *see*).

OPHELUS. A synonym of *Adansonia.*

OPHIOCAULON (from *ophis*, a serpent, and *kaulon*, a stem; in reference to its climbing habit). ORD. *Passifloreæ.* A small genus (three or four species) of stove, climbing, herbaceous, very glabrous shrubs, natives of tropical Africa, Natal, and Madagascar. They are allied to *Modecca*, but have a deeply five-parted calyx, obscure corona, and sessile stigma. The undermentioned, the only species in cultivation, thrives in well-drained sandy loam and leaf mould, and does best when planted out in a border inside the house, and its shoots trained near the glass. Care must be taken to guard against excess of moisture, particularly during the dull winter months. For propagation, *see* **Passiflora.**

Ophiocaulon—*continued.*

O. cissampeloides (Cissampelos-like). *fl.*, male ones numerous, in stalked, terminal, and axillary, trichotomously divided, many-flowered cymes. *l.* orbicular or cordate, glaucous, marked with black dots beneath, deep green, often mottled with white above, 2in. to 3in. long. Branches slender, cylindrical. West tropical Africa, 1869. SYN. *Passiflora marmorata*, of gardens. (G. C. 1871, 234.)

OPHIODERMA. Included under **Ophioglossum** (which *see*).

OPHIOGLOSSACEÆ. A sub-order of Ferns, characterised by the capsules being deeply two-valved, and opening down the side nearly to the base without a ring. There are three genera—*Botrychium, Helminthostachys*, and *Ophioglossum*—and about a score species.

FIG. 746. OPHIOGLOSSUM VULGATUM, showing Creeping Rhizome, and Barren and Fertile Fronds.

OPHIOGLOSSUM (from *ophios*, a snake, and *glossa*, a tongue; referring to the shape of the spike of fructification). Adder's Tongue. Including *Cheiroglossa* and *Ophioderma.* ORD. *Filices.* A small genus (about ten species) of pretty, stove, greenhouse, or hardy ferns. Sporangia sessile, arranged in two rows, so as to form a flattened spike, which forms a branch of the barren frond, or is entirely distinct from it. About five species have been introduced. For general culture, *see* **Ferns.**

O. bulbosum (bulbous). Rootstock tuberous. *fronds* 2in. to 4in. long, the sterile division placed considerably below the middle, ½in. to 1in. long, ½in. broad. *fertile spike* ¼in. to ½in. long peduncle 1½in. to 2in. long when fully developed. North America, &c. Half-hardy.

Ophioglossum—*continued.*

O. lusitanicum (Portuguese). Rootstock slightly tuberous. *fronds* 1in. to 3in. long, the sterile division placed below the centre, ½in. to 1in. long, about ¼in. broad, linear-lanceolate, the point bluntish, the base narrowed. *fertile spike* ¼in. to ½in. long; peduncle firm, ½in. to 1½in. long when mature. Mediterranean region, &c., 1816. Hardy.

O. palmatum (Palm-like). *sti.* 6in. to 12in. long, fleshy, flaccid. *fronds* like the letter V, 6in. to 12in. long, 4in. to 8in. broad, more or less cut from the circumference towards the centre into deep, blunt lobes. *fertile spikes* two to twelve, 1in. to 2in. long, arising from the stem or edge on the lower part of the frond, on short, nodding or spreading peduncles. Cuba, &c. Stove.

O. pendulum (pendulous). *fronds* pendulous, ribbon-like, without a distinct stem, 1ft. to 15ft. long, 1in. to 3in. broad, simple or forked. *fertile spike* usually low down, 2in. to 6in. long, on a peduncle shorter than itself, usually solitary. Polynesian Isles, &c. Stove. (H. G. F. 33.) *O. furcatum* is probably a variety of this species.

O. reticulatum (netted). Rootstock not tuberous. *fronds* 6in. to 12in. long, the sterile division placed about the middle, 2in. to 3in. long, 1½in. to 2in. broad, with a distinct haft and distinctly cordate basal lobes; veins distinct. *fertile spike* 1in. or more long, on a slender peduncle 2in. to 4in. long, much overtopping the sterile segment. Tropical America, 1793. Stove.

O. scandens (climbing). A synonym of *Lygodium scandens.*

O. vulgatum (common). Common Adder's Tongue. Rootstock not tuberous. *fronds* 6in. to 9in. long, the sterile division generally placed about the middle, 2in. to 4in. long, ¾in. to 2in. broad, ovate or ovate-oblong, without a distinct haft. *fertile spike* 1in. or more long, upon a peduncle 2in. to 4in. long, and considerably overtopping the sterile division when the plant is fully mature. Britain, &c. See Fig. 746.

FIG. 747. OPHIOGLOSSUM VULGATUM AMBIGUUM.

O. v. ambiguum (ambiguous). A smaller form, with linear-oblong blade, and a spike 1in. to 2in. in length. Orkney, Wales, &c. See Fig. 747.

O. v. pedunculosum (pedunculose). *fronds*, barren division like that of the type in form and size, but thinner in texture, and with a distinct haft. India, &c. Stove.

OPHIOPOGON (from *ophis*, a serpent, and *pogon*, a beard; a translation of the native Japanese name). Snake's Beard. SYNS. *Chloopsis*, *Flueggia* (sometimes spelt *Fluggea*), *Slateria*. ORD. *Hæmodoraceæ*. A small genus (four species) of hardy or half-hardy, perennial herbs, found in the East Indies and Eastern Asia as far as Japan. Flowers numerous, simply racemose; perianth white, or tinged with lilac, the tube obconical and adnate to the ovary; segments six; pedicels articulated, often aggregated. Leaves usually sessile, linear. The species are interesting and curious rather than pretty. They thrive best in a sandy soil. Propagated by divisions, in spring.

O. Jaburan (Jaburan). *fl.*, perianth white, or tinged with lilac; raceme sub-secund, rather dense, 3in. to 6in. long; scape 6in. to 2ft. long. July. *l.* 1½ft. to 3ft. long, ½in. broad, sometimes

Ophiopogon—*continued.*

variegated with white. Japan, 1830. Habit similar to *O. japonicus*, but more robust. (L. B. C. 1816.)

O. J. variegatus (variegated).* *fl.* deep violet-blue, freely produced in dense spikes. Berries deep blue, about the size of currants. *l.* linear-lanceolate, striped with green and creamy-white. Japan, 1863.

O. japonicus (Japanese).* *fl.*, perianth white; raceme loose, few-flowered, sub-secund, 2in. to 3in. long; scape 2in. to 4in. long, naked, angular. June. *l.* radical, erect, narrow-linear, nearly, or quite, 1ft. long, about ¼in. broad. Japan, 1784. (B. M. 1063.)

O. j. intermedius (intermediate).* *fl.* lilac, small, numerous; raceme loose, 2in. to 5in. long. Late summer and autumn. *l.* linear, ¼in. broad. *h.* 1½ft. China, &c., 1821. SYN. *O. spicatus* (of Don). The form known as *argenteo-marginatus* has its leaves edged with white; the flowers also are pure white.

O. spicatus (spike-flowered), of Don. A synonym of *O. japonicus intermedius.*

O. spicatus (spike-flowered), of Ker. A synonym of *Liriope graminifolia.*

OPHIOXYLON. Included under **Rauwolfia** (which *see*).

OPHRYS (an old Greek name used by Pliny, from *ophrys*, eyebrows; referring, perhaps, to the fringe of the inner sepals, though Pliny refers it rather to the use of the plant in painting the eyebrows). SYN. *Arachnites.* ORD. *Orchideæ.* A confused genus of very pretty, terrestrial, hardy or nearly hardy, orchids, allied to *Orchis*, but (except in one species) without any spur, and the lip is usually very convex. Upwards of thirty species have been enumerated; they are natives of Europe, Western Asia, and North Africa. Sepals sub-equal, free, often concave, spreading; petals two, narrow-oblong, entire. The species generally thrive best in a sandy, chalky loam. *O. apifera*, and the other British species, are suitable for the rock-garden; the rest are best grown in a cold frame. All may be propagated by divisions of the tuberous roots; but most of the species increase very slowly, or scarcely at all, under cultivation. The species best known to gardens are those here described.

O. apifera (bee-bearing).* Bee Orchis. *fl.* with greenish petals and rose-coloured sepals; lip as long as the sepals, with reflexed marginal lobes, the terminal one subulate, the rest hairy above; spike few-flowered. April. *l.* few, glaucous. Stem about 1ft. high. Europe (Britain). (Sy. En. B. 1467.)

O. arachnites (cobwebby). This species differs principally from *O. apifera* in the sub-deltoid, ovate petals, in the lip being longer than the sepals, and in the straight or incurved appendage. Europe (Britain). (Sy. En. B. 1468.)

O. aranifera (spider-bearing). Spider Orchis. *fl.* with green sepals and petals; lip dark brown, as long as the sepals, with roundish, hairy, reflexed, marginal lobes; spike few-flowered. April. Stem about 6in. high. Europe (Britain). (Sy. En. B. 1469.)

O. bombilifera (bee-bearing). Humble-bee Orchis. *fl.*, sepals green; petals recurved; lip deeply trilobed, the central lobe chocolate-brown, sub-globular, the lateral ones conical, and prolonged below; anther red, obtuse, bent backwards. *l.* small, oblong-lanceolate. Mentone, &c. (Fl. Ment. 72.)

O. lutea (yellow).* *fl.* ¾in. to 1in. in diameter; sepals oblong, obtuse, incurved, green; petals much smaller, yellow or yellow-green; lip nearly quadrate, golden-yellow, with a purple disk and a contracted base, convex, three-lobed towards the tip; scape 4in. to 7in. high, stout, many-flowered. *l.* spreading, linear-oblong, 1¼in. to 2¼in. long. South Europe. SYN. *O. vespifera.* (B. M. 5941.)

FIG. 748. FLOWER OF OPHRYS MUSCIFERA.

O. muscifera (fly-bearing). Fly Orchis. *fl.* with green sepals and dark red linear petals; lip twice the length of the sepals, with four expanded lobes, somewhat downy, and having a pale blue spot in the middle; spike slender, about six-flowered. June. Europe (Britain). See Fig. 748. (Sy. En. B. 1471.)

O. Speculum (looking-glass).* *fl.* greenish; lip quadrate-oblong, convex; the disk steel-blue, edged with gold, and the whole

Ophrys—*continued.*

broadly margined with maroon-purple. *l.* linear-oblong. Stem 4in. to 12in. high, bearing several flowers. South Europe, 1818. (B. M. 5844; B. R. 370.)

O. tenthredinifera (sawfly-bearing). *fl.* varying in colour; petals spreading; lip villous, oblong, obovate, the apex bilobed, appendiculate. April and May. Stems leafy. *h.* 9in. South Europe, 1815. (B. M. 1930; B. R. 205, 1093.)

O. vespifera (wasp-bearing). A synonym of *O. lutea.*

OPLISMENUS (from *hoplismenos*, awned; referring to the awns). SYNS. *Hekaterosachne*, *Orthopogon.* ORD. *Gramineæ.* A small genus (three or four species) of stove or greenhouse grasses, allied to *Panicum*, broadly dispersed over the tropical and sub-tropical regions of the globe. Spikelets one-flowered, articulated with the pedicel; glumes four; panicles unilateral. Leaves narrowly or broadly lanceolate, flat. These somewhat large-leaved grasses are of easy culture; they grow freely in a mixture of loam, leaf mould, and sand, and make nice plants for table decoration, &c. They are propagated by division; or by seeds, which are freely produced. The two species mentioned below succeed either in the stove or greenhouse.

O. hirtellus (slightly-hairy).* *fl.*, sheath pilose; spikes distant; common axis pubescent; spikelets three to ten, pubescent; lowest awn smooth, bluntish, three to five times as long as its glume; third glume shortly awned, furnished with a palea. June and July. *l.* lanceolate, acuminate, undulate, puberulous, 1½in. to 2½in. long. West Indies, 1795. SYN. *Orthopogon hirtellus.*

O. loliaceus (Tares). *fl.*, sheath glabrous, ciliate or pilose; spikes usually oblong; common axis nearly glabrous; spikelets fascicled; lowest awn three or four times as long as its glume; third glume shortly awned, furnished with a palea. July and August. *l.* oblong-lanceolate or lanceolate, acuminate, 2in. to 4in. long. Trinidad, 1820. SYN. *Orthopogon loliaceus.*

OPLOTHECA (of Nuttall). Included under *Frœlichia.*

OPOPONAX CHIRONIUM. A synonym of **Malabaila Opoponax** (which *see*).

OPORANTHUS. Included under **Sternbergia** (which *see*).

OPPOSITE. Placed on opposite sides of some other body or thing, and on the same plane.

OPUNTIA (the old Latin name used by Pliny, and said to be derived from the city of Opus). Indian Fig; Prickly Pear. ORD. *Cacteæ.* A genus of greenhouse, or hardy succulent trees or shrubs, natives of the tropical and warm regions of America; some of the species have become widely naturalised in the Old World. About 150 species have been described, but many of these are not sufficiently distinct to merit specific rank. Flowers yellow, red, or purple, lateral; calyx tube not produced above the ovary; lobes numerous; petals numerous, connate at base, spreading; stamens many-seriate. Berry pear-shaped, tubercled. Leaves scale-like, deciduous. Stem terete at base, branched; branches articulated, flat, compressed, globose or sub-cylindrical, tubercled; tubercles tomentose, spiny, the young ones leafy.

The cultivation of Opuntias is very easy. All that is necessary for plants in pots is to secure thorough drainage, and give all the light possible. Formerly, broken brick rubbish was supposed to be essential to their well-being, but good loam alone will do quite well. Powdered bricks, mixed with the loam, however, suit the smaller-growing kinds, and insure rapid drainage. During winter, a smaller supply of water is required; indeed, when at rest, the plants should be kept almost dry. The hardy species are extremely interesting, and grow freely in sunny spots in the open air, provided some means be adopted to guard against superabundance of moisture. Some of them, in their native habitats, withstand much more cold than ever is experienced in Britain; but the dry air, or the covering of snow, protects them. An ordinary hand-light, placed over the plants, is shelter enough, provided the position in which

Opuntia—*continued.*

they are placed is dry and efficiently drained. Opuntias may be propagated by means of the branches, or portions of them; these should, after being cut off, be laid on a dry shelf for a time, and then planted or laid on well-drained pots of loam and brick-dust; but very little water should be given until roots are emitted. Seeds, too, are readily raised; the appearance of the seedlings

FIG. 749. SEEDLING OPUNTIA, showing Mode of Germination.

is shown in Fig. 749. The following extracts from the "Transactions of the Horticultural Society" are interesting as showing what may be done in a Surrey garden; they are from a paper "On the Treatment of the Cactus Opuntia, or Prickly Pear; under which it will perfectly mature its fruit in the open air of England," read on 3rd Sept., 1816, communicated by Mr. John Braddick, Thames Ditton: "Having heretofore observed that the plant, in its wild state, delighted in a dry soil amongst rocks near the skirts of the sunny sides of the forests [the writer is speaking of Virginia], I, in consequence, planted it in the compost described below, placed in a sheltered position open to the sun. The first plant that I turned out has lived in the open ground of this country for six or seven years, during which period it has endured one exceeding hard winter, and several trying springs; and in all, except the first two years, it has never failed to ripen its fruit and seeds, so that it may be now considered decidedly naturalised. It is now growing vigorously; and, although the present season has been decidedly unfavourable, yet I doubt not but it will produce a plentiful crop of flowers, and ripen its fruit fit for the table during the course of the next month. . . . The compost used by me for growing the Cactus Opuntia is the following: One half is carbonate of lime, for which lime rubbish from old buildings will answer; the remaining half consists of equal portions of London clay and peat earth, having the acid neutralised by barilla; these are intimately blended and sifted. One square yard of this compost I conceive to be sufficient for one plant, which must be placed in the middle of a small artificial hillock, raised eighteen inches above the surface of the ground, which ground should be rendered perfectly dry, if not naturally so, by under-draining. Neither the leaves, flowers, nor fruit should ever be suffered to touch the ground; but they should, as constantly as they are produced, be kept from the earth, by placing stones, pebbles, flints, or

Opuntia—*continued.*

bricks under them, in imitation of artificial rockwork." All the species mentioned require greenhouse treatment, except where otherwise stated. Probably several others would succeed in the open, in addition to those marked hardy.

O. andicola (Andine). Plant much-branched; joints Cucumber-like, elongated, attenuated at apex, shining brownish-green in colour, at length woody; are olæ somewhat crowded, setose; prickles three or four, sub-rigid, slender, and one or two long ones, white. Andes of Chili.

O. arborescens (arborescent).* *fl.* beautiful purple, 2½in. to 3in. in diameter; stigmas eight. Summer. *fr.* about 1in. long. Stems about 5ft. high (said to attain a height of 20ft. or 30ft. at its southern limits); tubercles green, spiny, compressed-cristate, elevated, ¾in. long; spines very variable in number and size. Mexico, &c.

O. Auberi (Auber's). Plant erect, large; joints glaucescent, thick, oblong-ovate, with repand margins; areolæ remote; prickles mostly four, white, angular, one or two larger than the rest. Cuba.

O. aurantiaca (orange). *fl.* orange-yellow. Joints linear or linear-lanceolate, divaricate, compressed at apex, terete at base, marked with dark green spots around the areolæ; areolæ large convex, white-tomentose; spines unequal, the three longer ones rigid, brown, divergent, the two or three shorter ones white. *h.* 3ft. Chili, 1824. (B. R. 1606.)

FIG. 750. OPUNTIA BASILARIS.

O. basilaris (base-branching). *fl.* rose-purple, large. Summer. *fr.* sub-globose, deeply umbilicated. Stems low, branching only from the base: joints obovate, often retuse or fan-shaped; areolæ very close, densely covered with short, brown bristles. California, Arizona, &c. See Fig. 750.

FIG. 751. OPUNTIA BOLIVIANA.

Opuntia—*continued.*

O. Bigelovii (Bigelow's).* "Branches forming a dense head younger joints erect, adpressed, fragile, often shaken off by the wind, and covering the soil around, taking root everywhere, or sticking to the clothes of the passers-by, like burrs" (Engelmann). Joints 2in. to 6in. long, fresh light green, covered with the small, almost hemispherical tubercles, which are arranged mostly in thirteen spirals. *h.* 10ft. to 12ft. Colorado.

O. boliviana (Bolivian). Stem articulated, sub-erect; joints 2in. to 2½in. long, ovate-oblong, smooth, very pale green, becoming yellowish with age; tubercles round, young ones greyish-yellow; prickles 3in. to 4in. long, flexible, white, sub-pellucid. *h.* over 1ft. Bolivia. See Fig. 751.

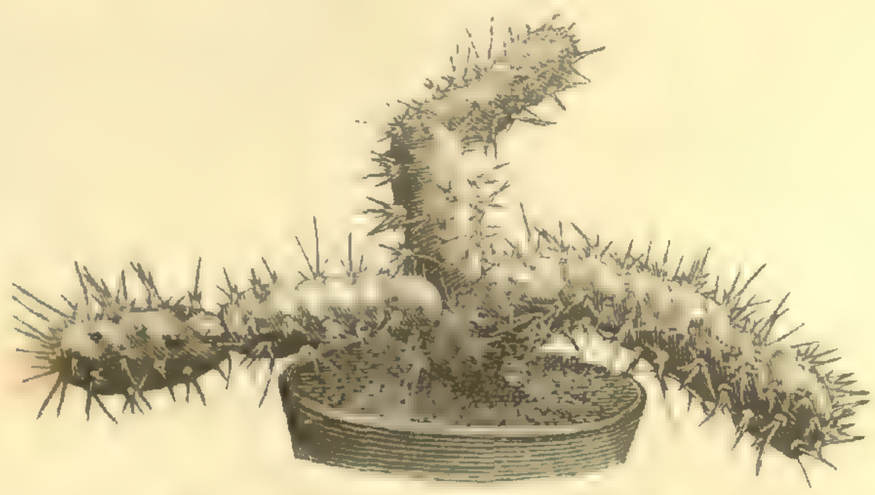


FIG. 752. OPUNTIA BRACHYARTHRA.

O. brachyarthra (short-jointed). *fl.* small: stigmas five. Plant ascendent; joints ovate or orbiculate, tumid, often sub-globose, tubercled; tubercles crowded; prickles in groups of from three to five. See Fig. 752.

O. braziliensis (Brazilian).* *fl.* bright lemon-yellow, 1in. to 1½in. in diameter; petals imbricated, sub-patent, the outer ones short, thick, and fleshy, the inner ones from ½in. to 1in. long. May and June. *fr.* transparent-yellow, sub-globose, with dense fascicles of chestnut-coloured bristles. Branches horizontal or declining, spiny; ultimate joints obovate or obovate-oblong. *h.* 10ft. to 30ft. Brazil, 1816. (B. M. 3293.)

O. candelabriformis (candelabrum-shaped). Plant sub-erect; joints obovate or elliptic, glaucous-green; areolæ somewhat crowded; prickles four or five, white, and one very long one. Mexico.

O. cochinellifera (Cochineal-bearing). A synonym of *Nopalea coccinellifera.*

O. corrugata (wrinkled). *fl.* reddish-yellow. August. Stem articulated; joints erect, cylindrical, green; areolæ crowded; prickles pale tomentose, the upper ones very minute and setaceous, the lower ones six to eight, white, and elongated. *h.* 2ft. Chili, 1824.

O. crinifera (hair-bearing). Plant sub-erect; joints ovate or elongated, slender, greenish; areolæ somewhat crowded, white, convex; lower prickles three or four, slender, slightly rigid, reddish; upper ones copious, white, long, silky. Brazil, 1846.

O. curassavica (Curassoa). *fl.* yellow. June. Plant sub-erect; joints fragile, cylindrico-ventricose, compressed, dark green, much divaricated; areolæ crowded, white-tomentose, slightly woolly; prickles three to five, unequal, dark, eventually becoming white, acutely pungent. *h.* 6ft. Curassoa, 1690. There are several varieties of this species.

O. cylindrica (cylindrical).* *fl.* scarlet, 1in. in diameter, inconspicuous, several together just below the ends of the branches; petals short, erect. *fr.* pale yellowish-green, 2in. long, 1in. broad. *l.* deciduous, ½in. long, cylindrical, acute. Stems several, cylindrical, the main one 6ft. or more high, all thickly armed with pale or white, fine, but not long, spines. Peru, 1799. (B. M. 3301.)

O. Davisii (Davis').* *fl.* of a remarkable bronzy-greenish colour, 2in. in diameter. Stems tuberculate-terete, ½in. in diameter; spines five or six in a tuft, about ½in. long. New Mexico, 1883. A small, shrubby species. (B. M. 6652.)

O. decipiens (deceptive). Plant erect, branched, green; branches spreading, cylindrical, attenuated at base; tubercles few, somewhat spirally disposed; areolæ small; central prickles yellow, tunicated, spreading-deflexed, the rest (three or four) smaller, somewhat radiating. Mexico.

O. Dillenii (Dillenius'). *fl.* yellow. September. Plant erect; joints obovate-rotundate, undulated, glaucous; areolæ clothed with yellow, eventually white, tomentum; prickles divaricate, yellowish, three to five small ones, and one strong longer one. *h.* 5ft. (B. R. 255, under name of *Cactus Dillenii.*)

O. echinocarpa (spiny-fruited).* *fl.* pale greenish-yellow, about 1½in. across. Summer. *fr.* depressed, deeply umbilicate, very spiny. A low, much-branched, spreading speces, with ovate-clavate joints densely covered with numerous spines, which are loosely coated with a whitish, glistening sheath. Colorado, &c.

O. Engelmanni (Engelmann's).* *fl.* yellow, with a reddish centre. May and June. Plant large, erect, 4ft. to 6ft. high; joints obovate. Chihuahua, 1864. Hardy.

Opuntia—*continued.*

O. Ficus-Indica (Indian Fig).* *fl.* yellow. May. *fr.* red within, bristly, ovate, edible. *l.* subulate, bristly in the axils, without spines. Stem erect, spreading; joints oval and obovate, 1ft. long. *h.* 2ft. Mexico, &c., 1731. Hardy. SYN. *O. vulgaris.* See Fig. 753.

O. floccosa (woolly). Stem club-shaped at base, thick, shining green, crested, tubercled; tubercles fleshy, prominent; areolæ axillary, elongated, woolly. *h.* from 4in. to 5in. Bolivia.

O. fragilis (fragile). *fl.* small. *fr.* ovate, scarcely spiny. *l.* minute. Plant sub-decumbent; joints small, ovate, somewhat compressed, tumid or sub-globose, hardly tuberculate, shining green; tubercles somewhat crowded, large, white-tomentose; prickles robust. North America, 1814.

O. frutescens (shrubby). *fl.* greenish, small. *fr.* scarlet, obovate, without tubercles. Plant shrubby, erect, with slightly erect branches; joints terete; spines almost solitary. Mexico, 1838.

O. glaucophylla (milky-green-leaved). Plant erect; joints obovate, somewhat undulated, glaucous; prickles one or two, subulate, less than 1in. long. Mexico.

FIG. 753. BRANCH OF OPUNTIA FICUS-INDICA, showing Fruits.

O. grandis (large). A synonym of *O. stenopetala.*

O. Kleiniæ (Mrs. Klein's). Plant erect, branched, greyish-green; branches erect, cylindrical, tuberculated; fascicles usually spirally disposed; areolæ velvety; prickles, one white, large, spreading-deflexed, the rest reddish-white, innumerable. South Mexico.

O. leptocaulis (slender-stemmed). Plant erect, branched; branches cylindrical, erect, tuberculated; fascicles spirally disposed; areolæ sub-tomentose; prickles about three, setaceous, greenish, patent-deflexed, the rest setose, crowded, reddish. North Mexico, 1845.

O. microdasys (small-thick).* Plant sub-erect, diffuse; joints obovate or lanceolate, green, thick at base; areolæ regularly clustered. South Mexico, 1845.

O. missouriensis (Missouri).* *fl.* light yellow. May to July. *fr.* dry, prickly. *l.* minute; axils armed with a tuft of straw-coloured bristles and five to ten slender, radiating spines, which are 1in. to 2in. long. Plant prostrate; joints broadly obovate and flat, 2in. to 4in. long, tuberculate. North America, 1814. Hardy.

O. monacantha (one-spined). Plant erect; joints large, elliptic or ovate-oblong, much compressed, glabrous, green; areolæ remote, with very short, greyish, bristly tomentum and a single, rigid, brown spine, yellow at apex. *h.* 1ft. Brazil, 1816. (B. R. 1726, under name of *Cactus Opuntia Tuna.*)

O. multiflora (many-flowered).* *fl.* yellow. Summer. Plant erect; branches large, ovate or elliptical, flattened; spines clustered, numerous, unequal. See Fig. 754.

O. nigricans (blackish). *fl.* pink. August. Plant erect; joints large, ovate or lanceolate, green; areolæ remote, fulvous; prickles two or three, unequal, divergent, rigid, dark greenish. *h.* 3ft. South America, 1795. (B. M. 1557, under name of *Cactus Tuna nigricans.*)

Opuntia—*continued.*

O. papyracantha (papery-spined). Plant with sub-globose joints and long, papyraceous spines. Argentine Republic, 1872.

O. Parmentieri (Parmentier's). *l.*, leaflets dark red, slender. Joints cucumber-like, pale green; areolæ spirally disposed, convex, with reddish-brown tomentum; lower spines two or three, white-stramineous. Paraguay.

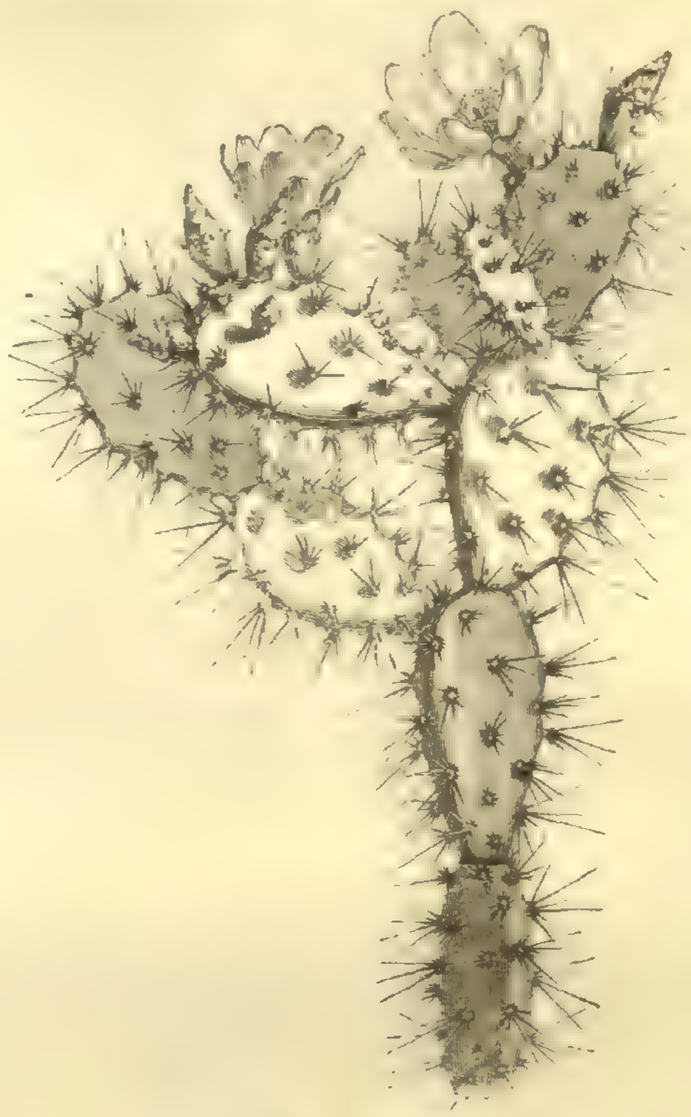


FIG. 754. FLOWERING BRANCH OF OPUNTIA MULTIFLORA.

O. Pes-corvi (crow-foot). *fl.*, yellow, large; sepals and petals eight to twelve, cuneate; stigmas four. Summer. Stems diffuse, prostrate; joints 1in. to 3in. long, cylindrical, or somewhat flattened, spiny; spines by pairs, unequal, elongated. *h.* 1ft. to 2ft. South United States.

O. phæacantha (gay-spined). *fl.* yellow, numerous, around the summit of the joints; stigmas six. June. Stem erect; joints oblong; spines yellow or brown painted, strong, unequal. *h.* 3ft. Mexico, &c., 1811. (B. M. 2691, under name of *Cactus polyanthos.*)

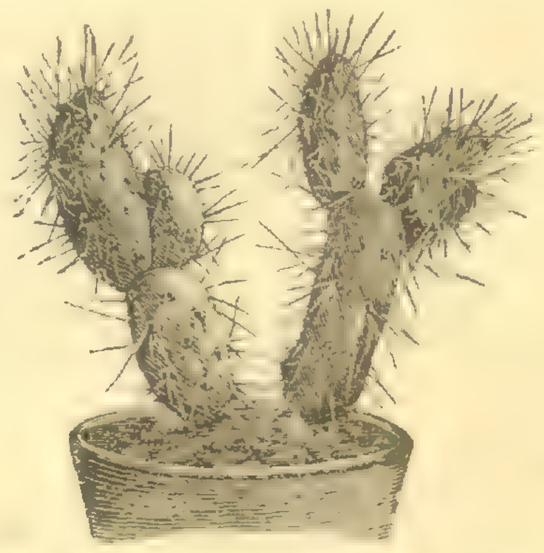


FIG. 755. OPUNTIA PLATYACANTHA.

O. platyacantha (flat-spined). Plant with a low-branching stem, with spreading, cylindric, slightly tuberculated, shining brown branches; areolæ large, immersed, armed with setæ and spines of different forms and sizes. See Fig. 755.

O. Pœppigii (Pœppig's). *fl.* pale yellow, 2in. in diameter, sessile or shortly-stalked, having an exceedingly short ovary, about ⅛in. long. *l.* incurved, cylindrical. Branches leafy; spines spreading, solitary, ¼in. to ¾in. long. Chili, 1884. A dwarf bush. (B. G. 1129.)

O. pulverulenta (powdery). Plant erect, thick, cylindrical, pale greyish-blue, powdery, with oblong tubercles; areolæ on the tops of the tubercles large, round, bristly, and with two prickles, one of which is very long and the other shorter. Tropical America.

Opuntia—*continued.*

FIG. 756. OPUNTIA RAFINESQUII.

O. Rafinesquii (Rafinesque's).* *fl.*, often with a red centre, larger, and with more numerous petals (ten to twelve) than in *O. vulgaris*. June. *l.* spreading, some of the axils bearing a few small spines and a single strong one, 9in. to 12in. long. Plant with deep green joints. *h.* 1ft. North America, 1868. Hardy. See Fig. 756.

O. Salmiana (Prince Salm-Dyck's).* *fl.* yellow, red. September. Plant erect, branched, of a greyish-green colour; branches cylindrical, without tubercles; areolæ somewhat crowded, white-tomentose, the mature ones pulvinately globose, the lower ones with three or four minute, reddish prickles. *h.* 2ft. Brazil, 1850. (B. M. 4542; L. & P. F. G. i. 101.)

O. Segethi (Segeth's). This species is similar in habit to *O. Pœppigii*, but has much longer flowers, the ovary being 3½in. long, with a few thick, cylindric, spreading bracts, 1in. long; corolla pale pink, 1½in. in diameter. Chili, 1884. (R. G. 1129.)

O. stenopetala (narrow-petaled). *fl.* yellow, small; sepals and petals subulate, sub-erect. Plant prostrate; joints large; prickles one to three, deflexed. Mexico, &c., 1835. SYN. *O. grandis*.

O. sulphurea (sulphur-coloured). *fl.* yellow. July. Stem articulated; joints erect, sub-globose, of a beautiful green colour; prickles pale-tomentose; upper ones bristly, dark purple, very minute, pencillately collected; lower ones six to twelve, elongated, acicular, white, purple at the apex; central ones very long. *h.* 2ft. Chili, 1827.

O. Tuna (Tuna).* *fl.* reddish-orange. July. *fr.* rich carmine, 2in. to 3in. long. Branches jointed, 4in. to 8in. or more long, oval or oblong, with distant bundles of yellow, unequal, spreading spines. Stem (of an old plant) sometimes 20ft. high. West Indies, &c., 1731. See Fig. 757.

O. tunicata (coated-spined). Plant sub-erect, much-branched; branches green, divergent, attenuated at base, tuberculate-areolar; areolæ obtuse, oblong, white-tomentose; prickles four to six large ones, and two or three small ones, all white, membranous, sub-pellucid, tunicated. Mexico, 1840.

O. Turpinii (Turpin's). Plant articulate, erect, low, with mammillariform tubercles, greyish-green; joints globose-ovate, crowded, young ones about 2in. in diameter; areolæ round, white-tomentose; prickles biformed, varying from three to ten lines long. Chili, 1844.

O. vulgaris (common).* *fl.* pale sulphur-yellow. June. *fr.* nearly smooth, pulpy, edible. *l.* minute, ovate-subulate and appressed; axils bristly, rarely with a few small spines. Plant low, prostrate or spreading, with flat and broadly obovate joints. *h.* 2ft. Mexico, &c., 1596. (B. M. 2393, under name of *Cactus Opuntia*.)

O. vulgaris (common), of Tenore. A synonym of *O. Ficus-Indica*.

ORACH (*Atriplex hortensis*). A plant sometimes cultivated for the use of its leaves, principally as a substitute for Spinach. It will grow in almost any soil, but produces the largest leaves in that which is rich. Sow seed in drills, 2ft. apart, in March, and again, successionally, if much in demand, as the plants soon run to seed. If seed is required, it should be collected before becoming quite ripe; otherwise, the wind will carry it away. The flowers should be pinched off if seeds are not to be kept. There are about three varieties, distinguished by their colours, *i.e.*, white or pale green, red, and purple. The plant commonly called Red Mountain Spinach (*A. hortensis rubra*) has fine, ornamental foliage, grows to a height of 3ft. or 4ft., and is very useful in sub-tropical gardening. It is a hardy annual; consequently, a new stock must be raised each year.

ORANGE. *Citrus Aurantium*, and some of the other members of the Orange family, have been cultivated for so long a period, and over such an extended geographical area, that it is scarcely possible to refer the numerous forms, which have originated under culture, to their respective and specific types. There can, however, be no doubt that the two or three parent types,

FIG. 757. OPUNTIA TUNA.

Orange—*continued.*

from which the host of forms have sprung, are of Asiatic origin. Some idea of the number of these cultivated varieties, and their range of differences in the size, form, colour, and taste of the fruits, may be obtained when it is stated that, in the "Histoire Naturelle des Orangers," a folio work, by Risso and Poiteau (1818), there are no less than 109 plates. The literature of the subject is very considerable; but the most important work, besides the one just mentioned, is Gallesio's "Traité du Citrus" (8vo), published at Paris, in 1811.

Under favourable conditions, the Orange is a very free bearer. Wallace mentions a tree in St. Michael's that bore 20,000 fruits in one crop. The longevity of the plant, too, is not less remarkable. At Versailles, one tree is still growing which was sown in 1421, and the famous tree, now upwards of 30ft. in height, in the Convent of St. Sabina, at Rome, is said to be more than 600 years old. "In Cordova, the noted seat of Moorish grandeur and luxury, in Spain, there are Orange-trees still remaining which are considered to be 600 or 700 years old" ("Treasury of Botany").

Some commentators suppose that the "Apples of Gold" were Oranges; but there does not seem to be any definite evidence that the Orange was cultivated in Palestine in the time of Solomon. More than 700 years later, Theophrastus, however, describes the Citron as occurring in Northern Persia (Media), and as being cultivated by the Jewish nation, in Syria, while under Roman dominion.

In 1884, no less than 4,958,838 bushels of Oranges and Lemons were imported into this country. Oils of Neroli and Bergamot, highly esteemed as perfumes, are obtained—the first, by distillation, from the flowers of the common Orange; and the second, either by distillation or expression, from the rind of the Bergamot variety.

Cultivation. At one time or another during the long period in which varieties of the Orange have been cultivated in this country, a few plants at least have been amongst the occupants of almost every garden of any extent, more especially in those established at an early date. An orangery, as it is termed, is usually a massive building, found in gardens adjoining old mansions, and not unfrequently constructed with a ceiling and a slate roof, on an architectural design externally similar in detail to the mansion. The custom was to grow Orange-trees in large tubs or pots, keep them throughout the winter in an orangery, and place them in the open air during summer. Since the introduction of glass into all houses devoted to horticultural purposes, and such numerous representatives in the way of plants have been brought from foreign lands, conservatories have taken the place of orangeries in most of the gardens of modern times. Orange-trees, too, are not grown now to nearly the extent they were formerly, even for ornamental purposes. In gardens where an orangery still stands, its special occupants seem to have vanished. This may partly be accounted for by the plants being exposed to a continued low temperature, by their being placed in a position throughout the winter, in a house with insufficient light, and by the application of too much water at this season. Orange-trees have at all times been grown in this country more as decorative plants than for the use of their beautiful fruits, when these are well ripened, for dessert. The highly fragrant flowers and glossy evergreen foliage are of themselves sufficient to render the tree deservedly attractive as a decorative subject; and the frequency with which orange blossoms are in demand for bridal festivals, &c., is well known as being another explanation of the plant's popularity. There is scarcely any part of the season when neither flowers nor fruits are present, in at least some stage of development, on trees of sufficient age and size for producing either or both of them.

Orange—*continued.*

Orange-trees grown in tubs should be provided with efficient drainage, and be placed in soil calculated to last a long time, such as a compost of good loam, to which may be added some dry cow manure or crushed bones, and some charred ballast, charcoal, or sand, to keep the whole open. If the roots become unhealthy, or are not properly attended to, indications of the foliage turning yellow and becoming sickly are soon apparent. In the treatment and cultivation of the Orange, it must be remembered that the tree is a fruit-bearing subject, and not, like many other evergreen plants, of use only for its flowers or ornamental foliage. As such, it must never be allowed to become very dry at the root, it must have a season of growth, and another of rest, and always have plenty of light. The roots, too, should not be interfered with more than is really necessary; but comparative restriction is recommended, provided the soil is good, and attention is given to applying an annual top-dressing in spring. Deer or sheep dung, with a little loam intermixed, forms an excellent top-dressing. When the trees are grown for ornamental purposes alone, they are not usually subjected to anything higher than a greenhouse temperature. Under this treatment, they commence growing about March, and often do not flower until towards Midsummer. The fruits which set afterwards are too late for ripening before autumn, and, consequently, they hang green throughout the winter, and do not ripen off until the following summer. Thus, under cool treatment, Oranges cannot be ripened in one season, and are then much inferior to what they would be if subjected to a higher temperature, more in accordance with the tree's requirements. It is surprising, however, to what an extent interest is evoked in the minds of visitors to garden establishments on seeing living specimens of trees whose fruits only have, hitherto, been so well known to them from foreign introductions. Orange-trees bear a considerable amount of ill-usage, and, in consequence of this, they are often subjected to so much neglect that specimens seen in gardens, showing signs of bad health by a stunted growth and small yellow leaves, instead of broad, glossy, green ones, are, perhaps, oftener the rule than the exception. The trees should have plenty of water throughout the summer, and be frequently syringed from February onwards to autumn, early in the morning, and again in the afternoon; this tends to keep the leaves clean and also to destroy insects. The plants may either be placed in a sheltered, warm position, outside, during June and the two following months, or kept in a greenhouse, with plenty of air and light. In autumn and winter, water should be partially withheld; but not to an extent sufficient to render the soil quite dry at any time. Any plants that fall into ill-health (indicated by the appearance of the leaves, as already alluded to), through neglect, or as a consequence of improper treatment, should be cut back somewhat in spring, placed in a moist, growing temperature, with some bottom heat, and be kept well syringed. The roots, too, should be examined, and if, as will most likely be the case, many of them are found dead, they should be shaken out, the dead portion cut away, and the others placed in an entirely new compost, with clean drainage, and in a smaller-sized pot or tub. Orange-trees in very large tubs have been efficiently brought from imperfect health into a thriving condition, by the latter being surrounded with a thickness of about 3ft. of fermenting material when the season of growth begins. This is renewed occasionally, until the tree is sufficiently restored to no longer need such help; and, as it is then later in summer, the mean natural temperature is considerably higher than when the new growth needed extra encouragement to induce it to start.

The natural habit assumed by Orange-trees prevents

Orange—*continued.*

the necessity of much pruning or training, merely the shortening of branches that are inclined to take a lead at the first, or in any year, at spring time, being usually all that is necessary to keep the plants compact. Those grown in large tubs are most frequently trained as standards, and the more cutting or pinching of the points is practised, the thicker do the heads become, and, withal, the more formal. If a free growth is allowed, and not much training attempted, the natural habit has, in consequence, a much better chance of development.

So far reference has only been made to Oranges cultivated in tubs or pots for ornamental purposes, or for

FIG. 758. FLOWERING BRANCHLET OF COMMON ORANGE.

the use of their sprays of fragrant blossoms (see Fig. 758) for personal or other decorations. The Orange is, however, worthy of much more attention than it at present receives, by way of cultivation under glass, with a view to the production of home-grown fruits. The excellence and superiority of any fruit that is allowed to become properly ripened before being gathered from the tree, over that which has to be procured and packed, with a view to the ripening process being completed afterwards, is well known in respect of English fruit productions generally; and Oranges are not exceptions to this rule. Anyone who has tasted home-grown Oranges, from trees that have received proper treatment in heated houses, will be well aware of the superior flavour they possess over nearly all those introduced from abroad. Good varieties are of importance, but these are procurable, at least in a sufficient number for all that is required. Although, in Britain, Oranges for fruit production cannot be grown in sufficient quantity to compete with countries where the trees grow freely outside, yet it is strange, considering the excellent quality of the fruit when properly cultivated, to what an extent the trees are neglected in this respect in the great majority of English gardens, even in those where almost every other important kind of fruit is represented. Many, perhaps the majority, of the imported Oranges are gathered when only partially ripe, or even when quite green; and they have, consequently, to ripen and change colour afterwards. This takes place, in great part, after they are packed for exportation, and during their voyage to various parts of the world.

Orange—*continued.*

Oranges cannot be grown to perfection in dark, slate-roofed houses, such as those built in former days specially for their reception, and to which reference has already been made. They are best suited by being grown in pots, or planted inside a span-roofed, heated, glass structure of considerable size, with sashes round the sides for the admission of plenty of light. According to the size of house and trees already at command, or of those it is intended to establish, the interior must be arranged, and beds provided, either for plunging pots in or for planting out the trees. A path may be made through the centre, with beds on either side; or the reverse plan may be adopted, and greater height obtained in consequence. Oranges are greatly benefited by bottom heat, although it is not an absolute necessity for their successful cultivation as fruit-trees. If the trees are grown in pots, these can be plunged in tan, slowly decaying leaves, or similar material, which may be used alone, or in conjunction with hot-water pipes; but, if planted out, heat will be best applied by constructing a chamber beneath the beds, through which pipes might pass. The latter should be thoroughly under control, by means of valves for regulating or entirely stopping heat. There is always a danger of the soil surrounding such chambers becoming unduly dry, and injury thereby caused to to the trees. This must specially be guarded against by strict examinations occasionally, and the application of additional supplies of water should be made over and above that required in other parts of the bed. Efficient drainage is of the utmost importance; from 6in. to 9in. of broken bricks will not be too much for beds, which should also be provided with a drain to

FIG. 759. FRUITING BRANCH OF COMMON ORANGE.

carry away the water; pots or tubs must have a quantity of crocks placed in them proportionate to their size. Loam which has been stacked a sufficient time to kill the grass is recommended for use in a large proportion; a little well-rotted manure may be added, but fruit-trees generally are better provided for by a manure, such as crushed bones, which is calculated to decay slowly, and, consequently, supply nutriment for a long time. Some sharp sand, burnt ballast, or mortar rubbish must be freely incorporated, to keep the whole bulk in an open, satisfactory condition. For the proper cultivation of Oranges in beds, a compost of this description should be used to the depth of from about 18in. to 24in.; and a similar mixture will be equally well suited

Orange—*continued.*

for trees in pots. The drainage, in either case, should have thin, turfy soil laid over the top, to keep it clean. Trees permanently planted out should have considerable space allowed between them. This space may be filled with movable pot-trees until the others grow and require it themselves. The portability of trees in pots is one point specially in their favour, and, if feeding is practised with them during the time the fruits are swelling, and watering is always properly attended to, excellent produce may be obtained from Oranges grown in such houses as those devoted to Fig-tree or Vine culture. Proper and good fruiting varieties only are suitable for the purpose; seedling plants are useless.

Respecting temperatures for Oranges grown for the use of their fruit as dessert, a little bottom heat at command is of importance all the year through. The trees should be encouraged to begin flowering in February by this aid, and a house or air temperature, in winter, of from 45deg. to 50deg. As the days lengthen, the minimum temperature may be increased

FIG. 760. FRUITING BRANCH OF MANDARIN ORANGE.

10deg., and it may be still further raised during summer. In spring, a bottom heat of 80deg. will not be too high for plunging Orange-trees in, if they are out of health, to induce them to start afresh; 70deg. to 75deg. is recommended for others in health. A very light shading in summer is advisable, should the plants be fully exposed to hot sunshine; otherwise, the leaves are liable to be burnt. Careful attention to airing, early in the day, during hot weather, aids materially in preventing scorching. Supposing the trees to flower in February and March, set properly, and receive proper treatment afterwards, the fruits (see Figs. 759 and 760) may be grown to maturity in from nine to eleven months—a long period in comparison with most other fruit-trees. Oranges require plenty of water in their growing season, and it should not be applied at a lower temperature than the soil in which the roots are situated. The free use of tepid water with the syringe or garden engine throughout the same season, except for a short time at the flowering stage, is an essential to success. It should be applied so as not to injure young leaves, but yet with sufficient force to keep the old ones clean, and prevent insects establishing themselves.

Of insects, the most troublesome on Orange-trees are White and Brown Scale, Mealy Bug, and Red Spider.

Orange—*continued.*

The first-named, in bad cases, can scarcely be eradicated without cutting the trees hard back, cleaning their stems, and starting afresh. Sponging, assiduously carried out, with an insecticide, so as to prevent any great quantity of insects from becoming established, should be practised for Brown Scale and Mealy Bug, or the trees may be occasionally syringed with petroleum and water (a very little of the former being used), and afterwards thoroughly syringed with clean water. Red Spider will have but little chance if syringing is practised throughout the summer with the garden engine, in the way above recommended.

Varieties of Dessert Oranges. Information has already been given that it is useless attempting the cultivation of Oranges for dessert except with good and suitable varieties. In "Dessert Orange Culture," one of a series of published papers by the late Mr. Thomas Rivers, of Sawbridgeworth, reprinted from the Report of the International Horticultural Exhibition and Botanical Congress, held in London in 1866, that excellent authority, and, probably, most extensive English cultivator of the Orange as a dessert fruit, makes the following trustworthy remarks respecting the varieties which, from experience, he had proved to be the best. There have been scarcely any other additions of importance made up till the present time:

"One of the most charming and prolific of dessert Oranges is the Tangierine; the tree has small leaves, and seldom attains a height of more than 7ft., even in North Africa. Its most valuable quality is its early ripening, so that, in October, just as the late peaches and other soft fruits are over, this luscious little fruit is ready for the dessert; and, when freshly gathered, no fruit can be more gratifying or delightful, as its aroma is so delicious, and its juice so abundant, in this respect offering a pleasing contrast to those imported from Lisbon, in November and December, the flesh of which is generally shrunk from the rind, instead of being ready to burst, as is the case with those plucked from the tree. They should, in common with all home-grown Oranges, be placed on the table with some leaves adhering to their stalks, thus showing that they have not made a voyage.

"Among full-sized Oranges, the Maltese Blood takes the first rank; when quite fresh from the tree, it differs much from those imported, although the voyage as now made by steamers is of short duration. . . . The great advantage in planting this sort is its tendency to bear fine fruit while the trees are young; they are, indeed, so prolific that trees of only 2ft. in height have here borne nice crops of fruit.

"Some varieties, quite equal to the foregoing in quality, but without the red flesh, so peculiar to these 'Blood Oranges,' have been imported from the Azores, the paradise of Orange trees. One of the most desirable sorts is called simply the St. Michael's Orange. This kind has a thin rind, is very juicy, and bears abundantly, even while the trees are young. In the Orange House these will ripen towards the end of December, and throughout January and February, in common with the Maltese Blood Oranges. . . .

"In addition to the three leading varieties I have mentioned, there are several kinds which will, doubtless, prove interesting and valuable. It is not to be expected that so much variation in flavour, as in the Pear, for instance, can be met with in Oranges. I believe, however, that, when our Orange palates are educated, we shall find many delicate distinctions in the flavour of Oranges. As far as I have gone, I have found the Mandarin Orange larger and more flat in shape than the Tangierine, and not so good as that sort. The Embiguo, the Egg, the Silver Orange, the Botelha, the White Orange, and some others, all varieties from the

Orange—*continued.*

Azores, are of various degrees of excellence, and are all worthy of a place in an English Orange Garden.

"The following descriptive list of the dessert Oranges may be useful to the amateur: Botelha and Dulcissima: Both thin rinded and very rich. Egg: Very large; rind thick; remarkably juicy, but not rich; a great bearer. Embiguo, or Navel Orange: Very large, with a curious, depressed calyx; remarkably rich and juicy. Exquisite: A thin-rinded, rich and juicy fruit. Maltese Blood: Large, oval, with a dark red pulp; exceedingly rich, good, and distinct; fruits from the same tree vary in colour from deep red to the usual pale yellow colour, with faint streaks of red. St. Michael's: Several varieties under this name vary in size and thickness of rind; they are all good. Silver Orange: Colour of rind pale yellow; flesh pale; rind very thin; flavour piquant and delicious. Sustain: Large, and remarkable for its rich, sweet juice. St. Michael's Tangierine: A very distinct variety, differing from the common sort in being deeper in colour, smaller, and more rich in flavour; a charming little Orange. Tangierine (often incorrectly called the Mandarin): Now a well-known sort, varying in shape from fruit much compressed, with rind rough and thick, to oval, with a smooth rind. Variegated Orange: This has a broad margin of white round its leaves, and forms a very ornamental tree; its fruits are oval, of medium size, with a pale yellow rind, striped with green; very juicy, and remarkably brisk and piquant in flavour. White Orange: Large; rind pale yellow, flesh very pale; flavour rich and good."

ORANGE GOURD. *See* **Cucurbita Pepo aurantia.**

ORANGE, OSAGE. *See* **Maclura aurantiaca.**

ORANGE ROOT. *See* **Hydrastis canadense.**

ORANIA (so called in honour of the Prince of Orange—*Oranien*). SYN. *Macrocladus.* ORD. *Palmeæ.* A small genus (three or four species) of tall stove palms, with robust, unarmed, closely-ringed stems, crowned with a dense head of large leaves; they are natives of the Malayan Archipelago and Papua. Flowers minute, unisexual, the spikes inclosed in double spathes, the inner of which is woody. Fruit globose, rather large. Leaf-segments linear, oblique at apex, white, scaly, and irregularly toothed or jagged at their tips. Oranias thrive in a sandy loam, and require an abundance of water when growing; good drainage is essential. They are raised from imported seeds, sown in bottom heat.

O. macrocladus (large-branched). *fl.*, spike pendulous. *fr.* a one-seeded drupe. *l.* pinnate. *h.* 40ft. Malacca, 1847. A stately tree.

O. regalis (Royal). *fr.* red, smooth, the form and size of a small Olive. *l.* 6ft. to 7ft. long; leaflets panduriform-sinuated, white beneath; primary nerves solitary. Trunk low, terete, annulate. Java, 1847.

ORBEA. Included under **Stapelia** (which *see*).

ORBICULAR, ORBICULATE. Circular or spherical.

ORCHARD. There are few gardens connected with private mansions that are of sufficient size for accommodating enough fruit-trees—such as Apples, Pears, Plums, &c.—to maintain a supply of fruits equal to the demands usually made. Orchards have, therefore, to be formed and established; sometimes for the special purpose of meeting such deficiencies, at others for cultivating to supply the market in addition; and again, in some parts, for the main object of procuring Apples to make, or convert into, cider. Those only required for cultivating fruits to supplement the garden crops are naturally best to be situated near the garden, and placed under the gardener's charge. They might contain, if the soil were tilled, small fruits of all descriptions that succeed, in

Orchard—*continued.*

addition to those above-named, and also many trees in size, shape, and variety that would be inadmissible in an Orchard where cattle were allowed. Various circumstances, such as the want of a proper site, or a suitable soil, may, however, render this arrangement—much akin to market gardening, although the produce need not be grown for sale—undesirable, and the best alternative is usually that of utilising a portion of farm land, varying in size according to requirements or the space available. The best of the produce in Orchards connected with private gardens has annually to be stored in the garden fruit-room, and the possibility of gathering and storing it at once in fine weather, without the fruits getting bruised, also the general overlooking of the crop throughout the season, are points greatly in favour of having the Orchard in near proximity. The farm Orchard is best to be laid down in grass, as the cost in the first place, and also subsequent management, will be much less than if the land were tilled. Grass should not, however, be grown for haymaking if it can be avoided, as this affects fruit-trees considerably, and most unfavourably; it should be kept short, preferably by being eaten off by cattle, such as sheep, or young stock that are being fattened. Horses should on no account be allowed if any branches are within their reach. As a general rule, fruit-trees in Orchards have, of necessity, to withstand, or at least be subjected to, more exposure than others situated inside a garden, unless the position of the latter is a most unfavourable one in respect of shelter. Only sorts of proved hardiness in the locality must, therefore, be selected for planting, and such as are calculated to withstand a more or less open situation, and produce crops with tolerable certainty when once established. It is well known that various localities materially affect different sorts of fruit, particularly Pears; in fact, there are but few good varieties of these latter that succeed at all as standards, except in most favoured parts. In the Midland and Northern counties, the number would be extremely limited if it were restricted to those only which are really suitable. The chief Orchard fruit-tree is, of course, that of the Apple, and as varieties of hardy constitution, which produce large, handsome fruits, suitable both for kitchen use or dessert, are now so numerous, none of an inferior character need be included. Still, it is almost certain that all will not succeed alike under similar treatment, and selection will also have to be made in accordance with the purpose for which crops are required, whether they are supplementary to those of the garden, and intended for private use, or grown more especially with a view to supplying the market. Orchards on a large scale are mainly planted with a view to disposing of the greater portion of fruit in the local, or in that of one of the great central, markets, and it will, in such cases, be advisable to know, at the outset, the sorts of fruits that are most in demand, as well as those which succeed best. Where the land is laid down in grass, and cattle admitted, the form of tree is limited to standards, unless provision is made for protecting the lower parts of any of another description. If the soil is tilled, and a sort of market garden system introduced, standards may, if desired, still occupy similar positions—though they would be better at greater distances apart—and the intervening spaces planted with trees of another shape, and such bush fruits as Gooseberries, Currants, Raspberries, &c. A considerable amount more labour is involved, as before stated, in attending to a tilled Orchard, than is requisite for one laid in grass; and this, with the character of the soil, and the value and possible demand for fruit of various sorts when grown, must be considered when an Orchard of either description is in course of formation. Besides the fruits already named, Cherries and Plums are largely

Orchard—*continued.*

represented in Orchards, in at least several of the English counties. Speaking generally, Cherries are not of much use to plant on a small scale, or even at all in most parts, as standard trees, in the open. Temporary protection cannot be afforded them, when thus situated, for preventing injury to the flowers by spring frosts, and great havoc is also caused by birds amongst the buds, as well as amongst the ripe fruits. Where the trees are known to succeed naturally in Orchards respecting the first-named condition, they may be planted in sufficient quantity to make it worth while having them looked after when the fruits are ripening, and both seasons would be greatly shortened by planting only one variety. Plums (under which Damsons may also be included) are limited in varieties suitable for culture in Orchards, especially such as are laid down in grass, many of the branches being situated so near the ground. Their fruits are, however, much in demand, and, in seasons when good crops can be secured, they usually prove more remunerative than most other supplies of home-grown Orchard produce. Damson-trees frequently attain a good size, and bear prodigious crops in favourable seasons; they should be planted rather close together, as the heads do not usually spread much; and, the wood being rather brittle, is less likely to get broken by heavy gales than if the trees were inserted as isolated specimens. Nuts may also be included amongst Orchard fruits, as they will succeed in nearly all situations and localities if their blossoms of both sexes escape destruction by spring frosts. If, however, there are Squirrels, or other depredators, about, it is of little use attempting to grow Nuts; at any rate, not as a profitable crop. A specimen or two of Quince-trees, and also of Medlars, should be provided with a place, as, although their fruits are not much in demand, a few are generally acceptable. The trees are also in keeping with the other occupants of an Orchard, and are, at least (apart from the use of their fruits), distinct and ornamental subjects, on account of their flowers and, in the case of the Medlar, beautifully-coloured foliage in autumn.

Soil and Situation. In the formation of an Orchard, the first points for consideration are those of soil and situation, the first-named being perhaps the most important of the two, although, in some respects, the other is not of secondary consequence. Drainage is of primary importance, and must be insured, either by a subsoil of a gravelly nature, by the natural disposition of the land, or by drains inserted specially for the purpose. No fruit-trees will succeed properly if stagnant water is allowed in or about the soil surrounding their roots. Respecting different soils, there are few in which the most important of Orchard fruits, Apples, will not thrive to a greater or less extent, as evidenced by such a quantity being grown, without special attention, in all parts of the country. The best and most lasting results, however, are obtained in well-drained land where the soil is of a good depth, and somewhat strong. Light or sandy soils tend to induce trees to bear good crops, but only for a short period, compared with those of a more holding nature. In some localities, there is little to choose from; but in others, great variation exists, even in a very limited area. Where subsoils are gravelly, and, consequently, naturally drained, it might, and most likely would, be very unwise to insert pipes, as by them too much water would be conducted away, and the trees, unless the rainfall were unusually heavy, would be unable to withdraw sufficient moisture to meet their requirements. The situation best suited for an Orchard is a gentle slope to the south or south-west. It is not advisable to select an eastern exposure, as, although the early morning sun is most desirable for many reasons, it frequently adds to the destruction, by frost, of fruit blossoms in spring, by causing the

Orchard—*continued.*

latter, when frozen, to thaw too rapidly. Shelter is of material importance, and, where it exists naturally, due advantage should, if possible, be taken of the site, provided other conditions are favourable. Much may frequently be done towards providing shelter to an Orchard, by planting a belt of quick-growing forest-trees — Larch or Poplars, for instance—at a safe distance away on the north and eastern sides, whence destructive winds proceed. These trees must not, however, be planted close enough for their roots to impoverish the cultivated ground. Orchard fruit-trees shelter each other to a certain degree when established, if they are not planted too far apart. To get them up to this stage, some protection will invariably be necessary; and, should the site be unfavourably situated in this respect, it must be provided, if only to the extent of planting a high hedge, to serve as a break against rough, cold winds. Exposure to full sun and light on the south side is recommended, as it is important that the wood of fruit-trees in a bearing state should be thoroughly ripened in summer for the next year, as well as the fruit of the current year. Spring frosts are far less injurious when the blossoms are strong and the wood firm, than when both are in the reverse condition.

Planting. This operation will depend somewhat on whether the land between the standard trees is to be laid down in grass, or dug and occupied with other crops and dwarf fruit-trees. If a piece of pasture land is taken for converting into an Orchard, without destroying the turf, it is most important that good-sized holes be dug out, so that the roots may be spread carefully, to their full length, in planting, and the soil moved for a considerable space round further than the distance to which they extend. Young trees would, however, be likely to succeed better were the land for an Orchard well broken up by deep ploughing, or, maybe, on a large scale, by steam cultivation, previous to being planted. The intervening space, to within a short distance of the trees, might then be annually cropped with such things as Potatoes or Turnips, but not with grain of any sort. As the trees get old enough for their heads to overshadow crops beneath, their roots will also have similarly extended, and the whole surface may then be sown with grass seeds, and changed into pasture. In tilled Orchards, where it is not intended to admit cattle at any time, the land between standard trees may be planted with others grown in bush or pyramid form, or with those usually termed small fruits. Standard fruit-trees for Orchards should have stems about 5ft. high, and be planted from 16ft. to 20ft. apart. A greater distance than this is sometimes recommended; but, as a rule, it is unnecessary, even for the admission of light and air, and the trees do not shelter each other so much as when they are somewhat closer together. November, if weather permits, is, perhaps, the best season for planting Orchards; but, if the operation cannot be conducted at this season, any favourable time up to the end of February may be selected, providing the weather is not frosty. No fruit-tree should be planted too deeply in the soil, with the idea of preventing its removal by the wind; a stake to each—in the case of standards, at least—must be provided for this purpose. The same depth as that to which the trees have previously been planted is usually a fairly good guide—say, from 3in. to 4in. of soil above the roots. Any newly-planted fruit-tree, over which the wind may have power, should, apart from being well trodden in, be securely staked, either temporarily or permanently, as the case may be; a little hay or moss, or a piece of old gutta-percha piping, should be placed where each tie is made, to prevent the bark being injured in tying, or afterwards by chafing. It is impossible for young roots to obtain a hold, if the trees are allowed to sway about, and break them off so soon as

Orchard—*continued.*

formed. A mulching of half-rotten manure, or anything of a non-conducting description, should always be applied to the surface so soon as the planting is finished; and watering occasionally, or, perhaps, frequently, according to the season, will doubtless be necessary throughout the following summer.

If the soil is of itself workable, as it should be, and fairly good, it would be best used alone around the roots of newly-planted trees. Manure is frequently very injurious in such a position, when it might be made of great benefit by being placed above, where its goodness could descend, and afford nourishment after some new root-growth were made. Feeding with manure may, at times, be carried to an excess; as, for instance, when strong, sappy growths are produced, instead of firm, short-jointed ones. A free growth should by all means be encouraged, particularly in young trees; but it is desirable that the wood should become well ripened in any case, and it is a necessity in trees large enough for bearing.

Pruning is not very much required in Orchards, except a little cutting back the first year or two, to insure evenly-balanced heads, and just enough thinning afterwards to prevent overcrowding. Much finer fruits are obtained from such fruit-trees as those planted in Orchards, when they are allowed to grow freely and naturally, always provided there is plenty of space for the admission of sun, air, and light.

Selections of Fruits for Orchards. Fruit-trees, as standards, to bear the exposure of an Orchard, must, of necessity, be free-growing, and of a hardy constitution, the degree of hardiness necessary being regulated somewhat by the locality. A list of such varieties of the principal fruits as are, from their strong-growing and generally productive nature, calculated to succeed, when treated in the way referred to, can only, therefore, be given.

Apples. Alfriston, Beauty of Kent, Blenheim Orange, Cellini, Devonshire Quarrenden, Duchess of Oldenburg, Dumelow's Seedling, Fearn's Pippin, Golden Winter Pearmain, Hawthornden, Herefordshire Pearmain, Kentish Fillbasket, Keswick Codlin, Lane's Prince Albert, Lord Suffield, Manks Codlin, Mère de Ménage, Northern Greening, Small's Admirable, Stirling Castle, Tower of Glammis, Warner's King, Worcester Pearmain, Wormsley Pippin, Yorkshire Greening.

Cherries. Adams' Crown, Bigarreau, Bigarreau Napoléon, Black Eagle, Büttner's Black Heart, Downton, Elton, Kentish, Knight's Early Black, Late Duke, May Duke, Morello.

Damsons. Cluster or Crittenden, Common, Farleigh Prolific, Prune, Rivers's Early.

Pears. Autumn Bergamot, Beurré Capiaumont, Doyenné Boussoch, Fertility, Hessle, Jargonelle, Jersey Gratioli, Louise Bonne of Jersey, Swan's Egg, Williams' Bon Chrétien, Windsor, Winter Nelis.

Plums. Diamond, Early Orleans, Goliath, Pond's Seedling, Prince of Wales, Victoria.

ORCHARD HOUSE. A most useful structure, devoted to the cultivation more especially of fruit-trees that do not succeed favourably in the open air. There are but few localities over the area covered by the British Isles in which any of our comparatively tender fruits can be obtained in perfection annually outside, and, in the more Northern parts, many of them fail altogether to produce crops, except under glass protection. Pot culture of fruit-trees in Orchard Houses has been practised some thirty or more years. It was at first confined simply to providing glass structures on a roughly-built scale; but many improvements have since been suggested and carried out, as a result of the experience gained, and because of the extent to which the system has been adopted, not only in this country, but in some parts of the Continent, and more extensively in the United States. An Orchard House may be either heated or unheated. The mere protection it affords, in spring and summer,

Orchard House—*continued.*

because of the bulk of warmed air contained in the interior, even when unheated by hot water, is most marked, even in favoured localities, when the fruits are gathered and compared with others of the same sorts grown outside. A very great advantage is, however, secured by having artificial heat at command in spring. At this season, mild weather may induce the blossoms to open earlier than is desirable, and a glass roof would be insufficient of itself to prevent injury, should there be a severe frost. Again, the prevalence of dull, cold weather at the same season is generally more injurious to expanded fruit blossoms than even a little frost with bright days; and this is the time for using a little artificial heat. It need not, and, in fact, must not, be used very much; but the exclusion of frost, and the preservation of a somewhat dry and airy atmosphere, are most important points to be secured onwards from the time the flower-buds expand. When the fruits are set, a little warmth will also materially help them to commence swelling: the fact that they cannot stand still, but must either swell in a short time or drop off, is but insufficiently recognised in gardens generally. Great attention is devoted to fruit-trees when in flower; they are protected by glass, and by coverings of various descriptions—very important precautions, certainly, yet, of themselves, only part of the necessary provision that should be made for assisting the fruits beyond, as well as at the flowering stage, when the weather is unfavourable towards them. A little heat at command also renders an Orchard House of much greater value in winter, when the fruit-trees are dormant. If the latter are limited mostly to such as are grown in pots, they may be arranged nearly close together, or even plunged amongst dry litter or bracken in a sheltered position outside, the house meanwhile being used for plants, such as Chrysanthemums, or others of a hard-wooded description, that flower naturally or have to be forced in spring. Orchard Houses are not usually meant to be used for forcing purposes, although fruit from trees in pots has, under proper treatment, been obtained from such structures equal in quality to that produced in special forcing-houses. An attempt at forcing a number of different fruit-trees in one temperature, and under similar conditions, would, moreover, end in failure—at least, in part. Take the same collection, and gradually bring the different trees forming it into flower, afford them protection at that time, and due attention in respect of cultural requirements throughout the summer, and, in all likelihood, the purpose will be effected for which an Orchard House proper should be intended. Plenty of heat is provided by the sun during summer; it should be utilised to the fullest extent just after the fruits are set, by closing the ventilators somewhat earlier on fine afternoons at that season than is requisite at other times. Fire heat should only be used when it becomes really necessary, and then a little ventilation at the same time is most desirable. To have it at command is, however, a valuable acquisition, which is of material importance for insuring crops, when, otherwise, they would be most likely to fail. Orchard Houses, in their simplest forms, are unheated; but the insertion of hot-water pipes, if only enough to exclude frost, is confidently recommended, for the several reasons already set forth. The main object is that of providing accommodation for the culture of good varieties of somewhat tender fruits, in order that finer produce and superior quality may be secured than that which it is possible to obtain from trees on outside walls, or from such as are in the open ground. The reference to selection being confined to good varieties, is suggestive of what should be specially considered in giving space to trees in an Orchard House. If the fruits of any are but second-

Orchard House—*continued.*

rate when so favoured, the trees should be discarded in favour of others that are more certain to fulfil expectations, and repay the extra attention afforded. The Orchard House and its uses having been so far explained, a reference may now be made to its size and shape, and to the general cultivation and treatment of the various fruit-trees worthy of being included amongst its occupants.

Size and Shape. These are points affecting each other somewhat considerably, so much depending on requirements, and the extent to which it is desirable or possible to adopt the system of fruit culture under notice. The form of structure best adapted is the span roof, as it affords a full amount of light to trees on all sides, and due provision can be made for the admission and free circulation of air, both at top and bottom—in the first place, by means of lifting a portion of roof at the apex, and, in the second, by the opening of upright sashes,

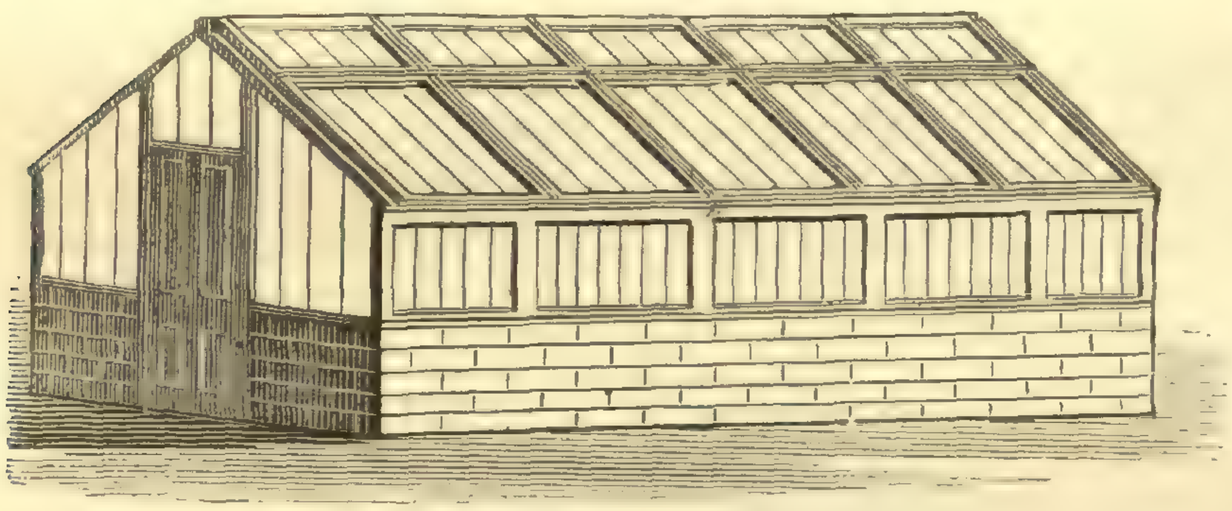


FIG. 761. SPAN-ROOFED ORCHARD HOUSE.

situated above the side walls (see Fig. 761) or weather-boarding—the latter being sometimes substituted in lieu of walls. In many Orchard Houses, only a little top ventilation is given in proportion to the quantity of air required, but there must be some to cause a free circulation about the trees. Airing is mainly conducted by means of side sashes, or by some method of ventilation situated near the ground line. Proportionate sizes for a rather large span-roofed Orchard House would be 50ft. long by about 24ft. wide, and from 12ft. to 15ft. high from the floor line to the apex; the height at the sides should be 6ft. This would admit of either a central or a side path arrangement inside. If a centre path were desired, beds could be formed on either side, for planting trees in or for standing them on, if grown in pots. A bed in the middle admits of more head-room for trees; but, in a house of the dimensions given above, a much better arrangement seems to be that of having a straight, neat path, made of gravel, from one end door to the other, a bed or border being on either side, then another narrow path for workmen to attend to watering, &c., and, finally, a border for dwarf trees round next the side sashes, and at the ends. Smaller span-roofed Houses, or those of another shape, would require a different arrangement; but these are, so far, only matters of taste, depending on the number and size of trees to be cultivated. Excellent fruits, particularly of Peaches and Nectarines, have been obtained from lean-to or half-span Orchard Houses; but these shapes do not admit of much head-room for trees in pots. The system of culture is of more importance than the form of house, yet the latter is of material help to the former; and the span-roof, having several points in its favour over any other shape, is, consequently, the one recommended.

Trees in Pots and Planted Out. Orchard Houses, in which it is desired to grow a variety of fruit-trees during spring and summer only, are best managed if the

Orchard House—*continued*

trees are grown in pots; a larger number may thus be accommodated in a given space than would be possible if they were planted out, and their portability allows them to be removed wherever desired, and to be placed up together in the winter. Planted-out trees do not require attention so frequently in watering; and, although this is an advantage, they are not so much under the command of the cultivators as if they were movable and their roots restricted. Pot-trees, on the other hand, depend very materially, for success or failure, on the attention given to watering. On an extensive scale, this means an enormous amount of work during the summer, as watering becomes necessary twice or thrice in a day. Manuring, by the application of a top-dressing of some rich compost and liquid manure, is also most essential in summer, in order to sustain health and fertility. It should be practised soon after the young fruits are set, and again when the second swelling begins. In the case of Peaches or Nectarines, a top-dressing should be composed of some rich manure and good loam in equal quantities; this should, if possible, be saturated with some liquid manure a few days previous to being used. Horse-droppings have proved an excellent ingredient for such composts, and so also has malt-dust. The mixture should be laid on the surface of the other soil to a depth of about 4in., and the inner part towards the tree left hollow for receiving the water supplied and preventing it from running away. Fruit-trees in pots require to be kept very nearly dry at the roots during winter, as, although the latter are seldom or never altogether at rest, they need being kept from undue excitement at this season. If the roots are kept saturated with water, ripening of the wood is but improperly effected, and, consequently, on the return of spring, many blossoms are imperfectly developed that would have been pushed forth had a system of withholding water in winter been practised. In the case of trees in large pots, especially of Apricots, Nectarines, and Peaches, there is seldom any necessity for watering at all between the beginning of November and the beginning of March, when the flower-buds will begin to swell or expand. It has already been stated that a sheltered place outside, in favourable parts of the country, will do, with proper coverings, for the winter, yet, for several reasons, Orchard-house trees are best kept under glass, if space can be afforded them in a structure where fire-heat is not allowed. Exposure to severe weather is ruinous to them. The pots would require a covering of bracken or dry litter all the same, to prevent their being burst by frost, should it be severe enough to reach them. Pot culture, in an Orchard House, has also another advantage, inasmuch as a greater variety can be grown in a given space, and if any sorts are found unworthy of having special treatment afforded to bring their fruit to perfection, they can readily be discarded, and their space re-occupied by other pot-trees of superior merit. It is most important that no roots be allowed to pass through the bottom and establish themselves in a border; consequently, provision should be made for preventing this, by placing two bricks together, and standing the pots on them.

Potting, or re-potting, of Orchard-house trees should be attended to soon after the fruits are gathered, and before the leaves drop. A large heap of soil should be prepared beforehand, where there is much to be done, and allowed, after being well mixed, to remain for a few days—or weeks, for that matter. It should be composed of about two-thirds loam, rather tenacious preferred, the other portion being well-decomposed manure. To this may be added, with advantage, some sifted brick and mortar rubbish, or chalk, particularly for stone fruits, and

Orchard House—*continued.*

sufficient bone-dust or fine horn-shavings to be visible when the bulk is mixed up. Trees that are in large pots, and are healthy, do not absolutely need their balls disturbed every year, beyond removing some old soil off the surface, and replacing it with new. Whenever the drainage is defective, or the roots or soil in bad condition, the trees should be taken out, their balls reduced with a pointed stick, and replaced in clean, properly-drained pots of a similar, or, maybe, even a smaller, size. Sufficient space must be allowed above the ball for the large quantity of water required in summer, and the soil should be rendered firm with a stout hand-rammer. When top-dressing only is intended, it may be practised in October with a stronger compost than that described above for potting, namely, more manure in proportion to the loam used; but a general overhaul is recommended earlier in the season, and new drainage, clean pots, and fresh soil supplied to the old (reduced) balls, with only few exceptions. Water should be given very sparingly after re-potting, until the injured roots shall have recovered somewhat the check experienced; it is most important, however, that the compost, when used, be suitably moist and workable. Before the flower-buds are so far expanded in spring as to show their colour inside, it will be advisable to stand the trees apart, as, if this is delayed, there is great danger of a large number of the former getting broken off. This appears a small matter to refer to; yet, from its apparent unimportance, it is frequently neglected, and many blossoms become broken off in consequence. It is almost an impossibility to separate entangled branches without such a result.

Thus much having been said respecting the culture of Orchard-house trees in pots, a reference may now be made to those planted out in a similar structure. First, it will be necessary to prepare borders of soil suitable for fruit-trees, instead of those of almost any description, which might answer well enough for pots to stand upon. It is unnecessary to make borders of a great depth; 2ft. of soil above the drainage is usually quite sufficient for such trees as may be recommended for planting out, such as Apricots, Peaches, and Nectarines. The soil for borders must be somewhat tenacious, and not be made over rich with manure. It should be rendered quite firm, by being rammed a few days after the trees have been planted and watered. It is important that fruit borders in Orchard Houses be allowed to remain firm and hard on the surface; the latter should not be broken, except being very slightly forked, in spring, to admit water all over alike. Surface roots are numerous on healthy trees, and they must not be broken off in spring, or there will be a great risk of the flowers dropping off, instead of setting. Mulchings of manure, or top-dressings, may be applied to planted-out trees, in summer, if they have heavy crops, and need help; but both should be avoided if there is evidence of the branches or shoots being already too vigorous, and, consequently, not likely to ripen well. Standard trees are, generally, best suited for planting out; those of pyramidal shape are soon liable to become uneven, because of the sap flowing more towards the upper branches and shoots, making them too gross, and rendering the lower ones weakly. This latter style of training is most successfully practised in pots, and, if standards are to be accommodated in borders, they should be sufficiently wide apart to admit of some pot-trees being arranged between. Standard Peaches and Nectarines are not, as a rule, very satisfactory, unless their heads are kept under proper management, and the shoots thinned so as to admit sun and air amongst them for properly ripening and colouring the fruit. Pear or Apple-trees are apt to grow too vigorously for planting in an Orchard House; their roots should be restricted in large

Orchard House—*continued.*

pots. Apricots succeed well as standards in Orchard Houses. The border, when prepared for them, should have a small portion of chalk intermixed, and some would also be of service to trees of the Peach and Nectarine. The soil should be made very firm, by treading and ramming, and, above all, should not be disturbed afterwards more than what is really necessary for getting water to soak in properly.

Methods of Training for Orchard-house Trees. The two kinds of fruit favoured, perhaps, most extensively with Orchard House protection, are Peaches and Nectarines. It has already been stated that, for planting in borders, standards or half standards, according to the height of the structure, are best suited for these fruits, and also for Apricots. The two first-named may be grown in pots as pyramids, or as bushes, the Apricot in pots being best adapted for the latter shape, or as a half standard. Cherries are most important Orchard House fruits, at least, if compact-growing sorts are selected, and they are worked on the Mahaleb stock, which induces a dwarf habit. The form of Cherry-tree most eligible either for planting or pot culture, is the pyramid. Plums of the finer dessert varieties are well worthy of glass protection, previous to, at the time of flowering, and throughout the season, in unfavourable districts. In warm parts, the trees are best to be placed outside, in a sheltered position, after the fruits are set. The fruits are considered superior if they can be properly ripened in the open air; but, should this be impracticable, the trees may be kept under glass, and subjected to free ventilation. It is when the trees are in flower that prospects of a crop are so frequently blighted by the havoc generally resulting from frost, rough weather, or a continued low temperature at that season. Pears are under the same disadvantage as Plums, and they succeed, under similar treatment, in Orchard Houses. Trees of both are best adapted for training in pyramidal form, and Pears are most fertile, and best suited for pot culture, when worked on Quince stocks. None but good varieties should be accommodated in an Orchard House, as considerable labour is incurred in potting, watering, and supplying all other requirements throughout the year. Apples also come under Orchard House fruits, as many of the good, yet somewhat tender, varieties, have been most successfully grown under glass, and the superior quality of the fruit obtained, compared with that of a similar sort from outside, has been favourably marked in respect of size, colouring, and flavour. Apples from trees grown under glass are readily distinguished, in an autumn exhibition, from all that have not been so favourably situated. This tree, like those last-named, succeeds in pots as a pyramid, preferably on the Paradise stock. Figs are sometimes included in Orchard House fruits; but they are best if provided with a higher mean temperature, and a house or compartment to themselves. A tree which should, if possible, be accorded a place along with Apricots, Peaches, &c., is the Mulberry. A good-sized standard of this in a tub will occupy but little space, and it will fruit abundantly, and the produce be far superior to any usually procured from the open air. Judicious summer pinching is most important in the training of Orchard House trees in pots, or of those planted out. Cordons are sometimes very useful, where space is limited, as excellent fruits are frequently obtained from trees of that form. Maiden trees can only properly be trained into the desired shape by people somewhat experienced in the art; yet sufficient knowledge may soon be obtained, by practice and observation, to supply all the attention necessary for preserving a fairly even balance afterwards. Summer pinching of the leading shoots may be practised twice, or even three times, in a year, to induce a compact habit. Cordon

Orchard House—*continued.*

trees may be pinched to three leaves or joints; bushes and pyramids may be allowed from four to six. Overcrowding must specially be prevented, otherwise sunshine, light, and a free circulation of air, are much impeded, to the detriment of the fruits, if there are any, or, at any rate, to the proper ripening of the shoots for the following year. Young trained trees of all sorts, suitable for culture in Orchard Houses, may be purchased from nurserymen who make such things a speciality, already established in pots, and set with blossom buds. Pruning may be performed in early spring, but it will not amount to very much, if summer pinching has been properly attended to, beyond thinning, and removing weak and superfluous shoots.

Airing and Temperatures. The Orchard House, above all other garden structures, should be provided with plenty of ventilation. This matter has already been referred to, but may receive a further notice. A span-roofed house, for the purpose named, should, preferably, run north and south; consequently, the side next the east will need to be carefully managed when cold winds from that quarter prevail, and there are any blossoms or tender foliage. In winter, the house, supposing the trees are inside, should be kept wide open whenever the temperature is above the freezing point. In spring, under such treatment, the trees will naturally move somewhat earlier than they would outside, yet they must never be unduly excited. A night temperature of 40deg. will be high enough, or even less than this, if the weather is severe. It should be remembered, that a confined atmosphere is more destructive to fruit blossoms under glass, particularly Apricots, Cherries, Plums, and Pears, than even a little frost. A circulation of air should, therefore, always be maintained, by leaving the ventilators open, more or less, night and day, according to the weather, until the fruits are properly set. Pears and Plums especially require a dry atmosphere, and plenty of air, to insure their setting freely. If fire-heat is at command, it will prove of immense advantage at this season, should frost or very dull weather prevail, yet it must be most cautiously applied, or more harm than good may result. By the time all the fruits are properly set, the season will have considerably advanced, and more solar heat will be procurable. This must be taken full advantage of, by closing early in the afternoons, with the exception of a little ventilation, which should be always kept on. In summer, early attention must be given to airing each fine morning, and the greatest possible amount of air be gradually admitted during the hotter portion of the day. No fixed scale of temperatures for the summer need be given, as it would be unnecessary to attempt following it in dealing with fruit-trees in Orchard Houses. The sun usually supplies sufficient heat after the end of April or May, without the use of hot water; and it is left for the cultivator to moderate its, at times, overpowering influence, by the admission of air, and the application of water about the house, and to utilise and conserve its valuable properties, by nearly closing the structure each day when the sun's power has sufficiently declined.

Syringing is an important point to be attended to in the culture of Orchard-house trees. From the time the fruits are safely set, until they begin to ripen, each tree should be thoroughly syringed, both in early morning and in the afternoon, except at times when experience and the weather suggest omissions. The water used should be of a similar temperature to that of the house, and it should be applied—preferably through a garden engine—with considerable force, after the foliage gets strong enough to withstand it. So soon as the fruits are gathered, pot trees may be stood in a sunny position outside, to thoroughly ripen their wood. They must, however, receive an equal amount of attention, in

Orchard House—*continued.*

respect of watering, &c., as before. Trees planted under glass must have all the exposure possible.

Insects. Orchard-house trees seldom escape the attacks of several most destructive insect pests. No sooner are leaves developed, than Green or Black Aphides appear; sometimes the latter are to be seen first on the wood, or fruit blossoms. Fumigation, on two or three successive evenings, will dislodge these pests; but this must only be practised previous to, or after, the trees have flowered. Red Spider is invariably found, in greater or less quantities, on fruit-trees under glass. It can be kept in check by the frequent syringing already recommended, both beneath and above the leaves, but seldom altogether destroyed by any available application. Brown Scale is also frequently to be seen on fruit-trees; it fixes itself in crevices, and on the bark, and can best be destroyed by hand-washing, or scrubbing with a rather strong solution of soft-soap water.

ORCHESTES (Spring Weevils). The name given to a genus of *Curculionidæ* (small beetles) that, at times, do great harm to Beech-trees and hedges, and, in a less degree, to Oaks, and to a few other trees. They are usually about ⅛in. long, but may vary from 1/16in. to ¼in., and, in colour, are reddish, brown, or black. The body is nearly oval; the head is small, and the beak about as long as the thorax, and strongly bent downwards; the antennæ are situated near the base of the beak, and are eleven-jointed and elbowed, with the club oblong-ovate. But the most ready means of recognising them is their power of leaping, which is given by the great size of the thighs of the last pair of legs. The enlarged thighs contain correspondingly powerful muscles, and the beetles, when touched, leap surprising distances.

Mode of Life. Those that survive the winter eat their way into buds, and the females lay their eggs alongside the midribs, on the lower surface of the leaves. The larvæ burrow into the leaves, and there form large galleries or patches between the surfaces, and in these change to pupæ, from which the beetles soon emerge. A severe attack by these insects on any kind of tree or shrub causes the leaves to become prematurely withered, or even useless, and considerably injures the health of the plants.

Remedies. In the mornings, shake the beetles off the plants, over a tarred vessel, from which they cannot escape, and pick off and destroy the leaves that show mines of the larvæ. Of course, both methods are applicable only to small trees. Very little can be done to limit the injury to forest-trees; but of these we are not treating here. The most hurtful insects in this genus are: *O. Fagi*—a small species (1/12in. long), black, with a faintly reddish, less often greenish, thin coating of short hairs, limbs paler, thighs one-toothed—often very abundant in June and July on Beeches; and *O. Quercus*—which is larger (⅛in. to ¼in. long), of a dull brick-red colour, slightly hairy, eyes black, wing-cases with a large triangular ashy patch over their place of meeting at the base, thighs of front legs each one-toothed, of hinder pair each with a double row of six or seven spines—frequent on Oaks. Others occur on Alder, Hazel, Elm, &c., but do not call for a longer notice.

ORCHIDEÆ. A very large order of monocotyledonous plants, and one of the most natural families of the vegetable kingdom. Herbaceous terrestrial perennials, with tuberous or fascicled roots; epiphytes (with or without pseudo-bulbs), found generally growing on the trunks of trees, to which they attach themselves by their long adventitious roots; or saprophytes. Flowers solitary, spicate, racemose or paniculate; perianth superior, irregular, of six coloured segments, the three outer (the sepals) nearly similar, free, or the two lower ones

MISSOURI BOTANICAL GARDEN.

Orchideæ—*continued.*

connate (*Cypripedium*), or all three coherent (*Masdevallia*); the inner lateral (the petals) similar; the third inner segment (the lip) originally superior, but afterwards becoming inferior by the twisting of the pedicel, dissimilar, usually larger, extremely varied in shape and colouring, frequently spurred (*Angræcum*, &c.) or pouched (*Cypripedium*); stamens united with the style into a column, usually one opposite the upper sepal, sometimes two (*Cypripedium*) opposite the two lateral petals; anther two-celled (or one-celled by absorption of the septum), or four-celled by more or less perfect secondary septa; pollen agglomerated into two, four, or eight, pear-shaped, usually stalked masses (pollinia), lodged in the membranous pockets of the anther, and composed of grains, usually collected by fours into numerous groups, cohering by means of elastic filaments, or gathered round a cellular axis; grains sub-pulverulent, easily separable, or agglutinated into a solid, compact, waxy tissue; pollen-masses sometimes free, usually fixed, either directly or by means of a pedicel (caudicle), to a viscous gland (retinaculum), which may be exposed, or inclosed in one or two pouches; ovary inferior, often long, and twisted, one-celled (more rarely three-celled), trigonous; style often terminating in a beak (rostellum) at the base of the anther, or between its cells; stigma a viscid surface facing the lip, beneath the rostellum; seeds innumerable, very minute, fusiform; testa very lax-reticulate and albuminate. Leaves sheathing at the base, glabrous, rarely velvety (*Eria*), very firm in texture (*Cattleya*), or membranous (*Liparis*), cylindric (*Brassavola*), linear (*Isochilus*), or linear-lanceolate, usually entire or emarginate, as in *Vanda*, or some Angræcums, fan-shaped (*Pogonia*) or heart-shaped (*Listera*); nerves parallel, rarely reticulate (*Dossinia*, &c.), now and then developing buds on their surfaces, as in some Spiranthes and Malaxis. Stem or scape usually simple, cylindric or angular, often leafless. According to the authors of the "Genera Plantarum," there are 334 genera and about 5000 species; in that work, these are divided into f..e tribes, the principal distinguishing characteristics of each being here given.

TRIBE I. EPIDENDREÆ. Anther one, dorsal, operculate, usually incumbent, with the cells distinct and parallel; pollinia waxy, in one or two series, parallel, two to four in each series (one to four in each cell), free, or joined in each cell by a little viscous substance, or a granular appendage, very rarely attached to the rostellum. This tribe contains eighty-eight genera, and is divided, by Bentham and Hooker, into nine sub-tribes; it is represented, in both hemispheres, by both terrestrial and epiphytal genera, and includes some of the most beautiful garden plants: *Calanthe*, *Cattleya*, *Dendrobium*, *Lælia*.

TRIBE II. VANDEÆ. Anther one, dorsal, operculate, incumbent, or applied to the rostellum; cells most frequently confluent; pollinia waxy, usually two or four, applied to each other in pairs, posterior and anterior. *Vandeæ* is divided into nine sub-tribes, and contains 129 genera, the great majority being epiphytes. This group is represented almost in equal numbers in tropical Asia and America; there are many members in Madagascar, few in Africa, and very few beyond the tropics. Familiar examples are: *Aerides*, *Odontoglossum*, *Oncidium*, *Phalænopsis*, and *Vanda*.

TRIBE III. NEOTTIEÆ. Anther one, posterior, operculate, or erect and persistent; cells distinct, parallel; pollinia granular, powdery, or sectile. Stems without pseudo-bulbs. There are six sub-tribes of *Neottieæ*, and eighty-one genera, nearly all of which are rhizomatose terrestrial plants—*Vanilla* is sub-epiphytic. They have erect, simple stems, which are leafy at the base, or are quite leafless. *Neottieæ* are represented in both hemispheres, a considerable number being extra-tropical. Examples are: *Anæctochilus*, *Pogonia*, *Sobralia*, *Vanilla*.

Orchideæ—*continued.*

TRIBE IV. OPHRYDEÆ. Anther one, posterior, erect, prostrate, or reflexed, with parallel or divergent, distinct cells adnate to the clinandrium, and often continuous with the rostellum; pollinia granular, produced into a caudicle in each cell. There are thirty-two genera of *Ophrydeæ*, divided into four sub-tribes. All are terrestrial plants, with tuberous roots, the largest number of genera being found in South Africa, and but few in the tropics. The species are, perhaps, most numerous in the Mediterranean region. Examples are: *Aceras*, *Disa*, *Ophrys*, *Orchis*.

TRIBE V. CYPRIPEDIEÆ. Anthers two, lateral; the rostellum prolonged into a shield between the anthers; pollen powdery. This tribe contains but four genera, only two of which, *Cypripedium* and *Selenepedium*, are in cultivation; the first is widely distributed over the temperate and tropical regions of both hemispheres, the latter being confined to the mountainous regions of South America. The two genera not in cultivation, *Apostasia* and *Neuwiedia*, are respectively limited to tropical Asia, and Australia and tropical Asia. All four are terrestrial herbs.

Linnæus, in the middle of last century, only knew about a dozen exotic orchids, whereas now, probably, half the known species are, or have been, in cultivation in this country. By far the larger number inhabit tropical forests; they become less plentiful in temperate regions, and are almost absent from very cold ones—perhaps not more than two or three enter the Arctic Circle. They vary exceedingly in size; the Javan *Galeola altissima*, which has been said to be the largest known orchid, attains a length of more than 100ft.; but a Vanilla has been seen under cultivation with a stem even longer than this. *Drymoda picta* is one of the smallest of Orchids; it has a dull green, small, disk-like pseudo-bulb, from which springs a minute and very deciduous leaf. *Angræcum funale*, and some other species of the same genus, as well as some of the African Vanillas, are quite leafless, and depend upon the chlorophyll present in the strap-like roots of the first-named, and in the long stems of the latter genus.

Scarcely any natural order of plants is more free from fungoid attacks than are *Orchideæ*; for what is known about the fungi which have been observed on cultivated Orchids, the reader is referred to a paper by Mr. Worthington G. Smith, in the "Gardeners' Chronicle" (n. s., xxiv. p. 693). This volume also contains an account, by Professor Westwood, of the various phytophagous insects which have been found on imported Orchids. Among some of the other important results of the Orchid Conference of 1885, may be specially mentioned the paper on the Hybridisation of Orchids, by Mr. H. J. Veitch. This also is published in the "Gardeners' Chronicle" (n. s., xxiv. p. 628), and is illustrated by figures of seeds and seedlings of *Cypripedium*, *Dendrobium*, and *Phalænopsis*.

"Of the few orchids which are of use to man, the Vanillas (*Vanilla claviculata*, *planifolia*, &c.) hold the first rank. They are sarmentose plants, natives of the hot and damp regions of Mexico, Colombia, and Guiana [and tropical Africa]. Their fruit is a fleshy, long capsule, and the black, globose seeds are enveloped in a special tissue, which secretes a balsamic oil; if kept in a dry place, the capsule becomes covered with pointed and brilliant crystals of benzoic acid, and imparts its delicious perfume to various delicate dishes, chocolates, liqueurs, &c. The Faham (*Angræcum fragrans*) is a native of Bourbon; its leaves, known as Bourbon Tea, taste of Bitter Almonds, and smell like Tonquin Beans; they are used to stimulate digestion, and in pulmonary consumption. Salep, which is imported from Asia Minor and Persia, is produced by the tubers of several species of *Orchis*, which are equally natives of Europe (*O.*

Orchideæ—*continued.*

mascula, Morio, militaris, maculata, &c.). Salep contains, in a small volume, an abundance of nutritive starch, associated with a peculiar gum, analogous to Bassorine; it was formerly considered a powerful analeptic; it is now used as a sweet, scented jelly, or mixed with chocolate. The root of Helleborine (*Epipactis latifolia*) is employed for arthritic pains; those of *Himantoglossum hircinum, Spiranthes autumnalis,* and *Platanthera bifolia,* are reputed to be aphrodisiac. The flowers of *Gymnadenia conopsea* are administered for dysentery; and, in North America, the tubers of *Arethusa bulbosa* are used to stimulate indolent tumours, and in toothache. The root of *Spiranthes diuretica* is renowned in Chili. The rhizome of *Cypripedium pubescens* replaces the Valerian as an antispasmodic, in the estimation of the Anglo-Americans" (Decaisne and Le Maoût).

ORCHID FERTILISATION. The great source of information on this, as on so many other important and interesting questions in Natural Science, is to be found in the writings of Charles Darwin, who has written, upon this subject, the well-known work "On the Various Contrivances by which British and Foreign Orchids are Fertilised by Insects." This book must always be referred to by those who wish to understand the very curious structures that adapt many Orchids, in a very peculiar degree, to benefit by the visits of insects, while a smaller number are adapted for self-fertilisation alone. Not a little information is contained also in the works of Dr. Hermann Müller (of the chief of which a translation has been published, entitled "The Fertilisation of Flowers"), of Professor Asa Gray, of Delpino, and of many others, whom it is impossible here even to enumerate.

An endeavour will be made here to bring together some of the more interesting results arrived at by the various writers, [selecting a few of the more characteristic examples from the species native in Britain, and thereafter giving a short account of some exotic species that exhibit peculiarities not met with in British Orchids. The flowers of Orchids in general are very curious in form and arrangements of their parts. This is well seen in the many figures of Orchids that have appeared in this dictionary (*see* **Aceras, Aerides, Calanthe, Cattleya, Chysis, Cœlogyne, Cymbidium, Cypripedium, Dendrobium, Epidendrum, Masdevallia, Maxillaria,** and **Miltonia**).

But, despite this diversity, it is never difficult to recognise, that each flower is supported on a stalk, twisted half round, and that, when cut across, there are very many ovules visible in the stalk, and that this part really encloses the ovary, which is, therefore, inferior, and consists of three carpels, joined usually along their edges only. The flowers show six parts externally, viz., three sepals, much alike, and three petals, of which the lower one, in the mature flower, is almost always larger, broader, and more handsomely coloured than the others, and is called the labellum. It is often peculiar in form also, and very frequently it ends in a spur, which projects backwards, as the nectary. This latter, frequently, does not exude nectar into the tube, but contains it in the thin cells lining the latter; the walls of these cells are so thin as to allow insects (even moths) to pierce them readily, so as to obtain the juice. The tube is often nearly absent, but it is often of great length, and permits the honey to be secured only by insects with long probosces (such as some moths and butterflies possess), or by boring holes from without, as humble bees often do. This latter method, of course, does not benefit the flower at all. The essential, or reproductive, organs in the flower, consist of the stigmas and the fertile stamen, or, in *Cypripedieæ,* the two fertile stamens, and the remains of two stamens, or of one stamen reduced to the state of a staminode,

Orchid Fertilisation—*continued.*

i.e., of a stamen no longer of use in forming pollen, but modified to perform some other function for the welfare of the plant. The relation of the larger parts of the flower to one another, will be more easily understood

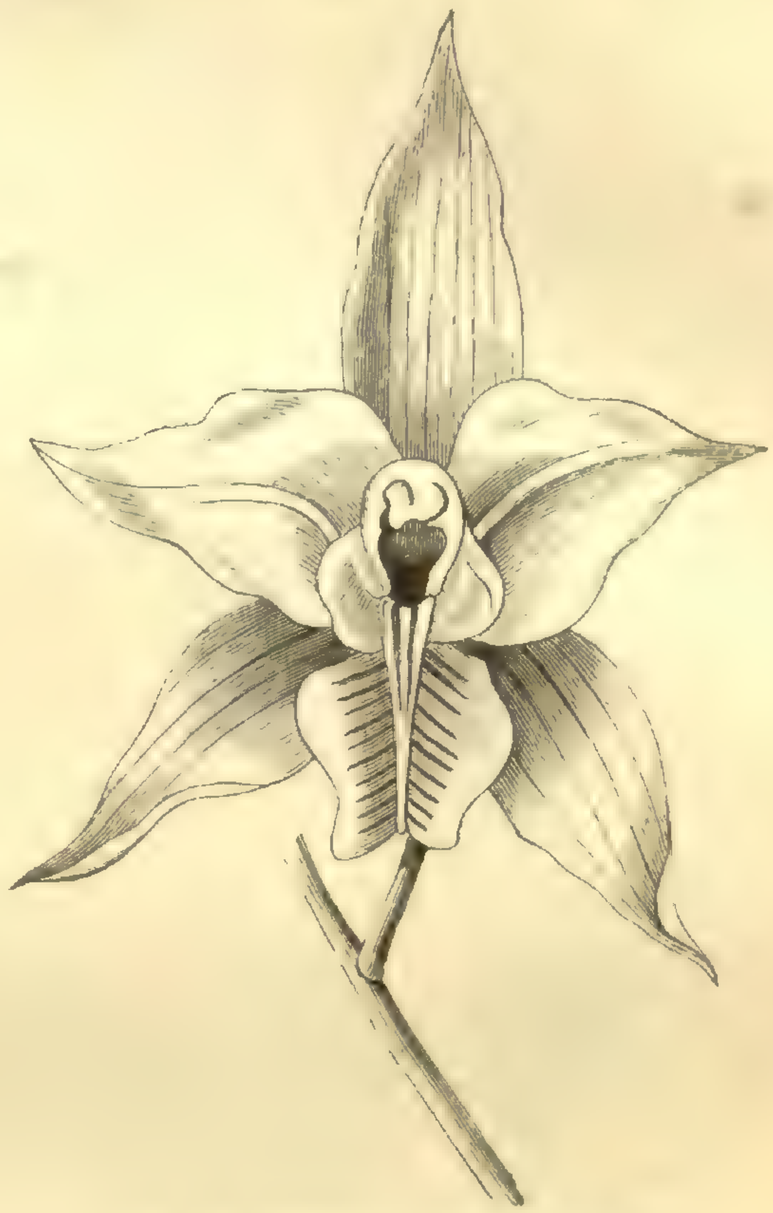


FIG. 762. FLOWER OF LÆLIA ALBIDA.

from the accompanying woodcut of the flower of *Lælia albida* (see Fig. 762). The sepals are the three narrower parts, situated behind, and overlapped by, the three petals, of which the lower in the figure is the labellum or lip. The dark, central spot is the opening of the nectary; and the upper part of the spot, is the situation of the stigmas. In Orchids, only two of the three are developed as stigmas, and often—in fact, usually—they unite. Just above the dark spot is seen the column, united to the labellum by two ridges. This column is regarded as formed by the fusion into one body of the upper part of the carpels, the fertile stamens, whether one or (in *Cypripedium*) two, and probably three or (in *Cypripedium*) two undeveloped stamens; but of the latter, as a rule, no clear trace remains. At the tip of the column is a body—the rostellum—usually regarded as the third stigma become useless as a stigma, but of great importance in securing the conveyance of pollen from one flower to the stigma of another. The labellum is also believed to be of compound nature, and to be formed of two metamorphosed stamens, and the median petal, closely united in growth.

The structure of the fertile stamen, and the process by which pollen is conveyed from it to the stigma of another flower, by insect aid, in a common British Orchid will next be described, selecting, as a widespread and easily-obtained plant, the Spotted Orchis (*Orchis maculata*). In this species, the perfect stamen is situated on the front of the column; and in the anther there are two pouches, in which the pollen grains are inclosed. The grains are joined together into small masses, and these, again, are joined to form a single mass (pollinium) in each chamber. Each pollinium is formed like a club, supported on a slender stalk (caudicle), which ends below in a round, sticky ball. The two

Orchid Fertilisation—*continued.*

balls lie almost side by side, and are covered by an elastic membrane formed by the rostellum. This membrane prevents the disks from drying, which would render them useless. It is at first continuous over the disks, but it soon tears across, and, on being touched, it is easily dragged down, leaving them bare.

When a suitable insect (*e.g.*, a moth) visits the flowers, and conveys the pollen of one flower to the stigmas of the next one visited, it pushes the proboscis down the tube of the labellum, and, in doing so, its proboscis, or its head, rubs against the membrane, and, depressing it, lays bare the sticky disks of the pollinia. These, as soon as they are touched, adhere to the part with which they are in contact, and, on the insect withdrawing its head, one or both of the pollinia are also withdrawn. They are erect when first withdrawn, but, in about half a minute, as the disks dry, the pollinia bend forward, and thus come to lie nearly alongside the proboscis, or other body, in the very best position to bring them into contact with the stigmas of flowers visited later. Owing to the little interval that elapses before the pollinium is in the suitable position, the insect has usually visited all the flowers on a stem before any of the pollen could be left in flowers of the plant from which it was taken; hence, cross-fertilisation between different plants is favoured. When a pollinium touches a stigma, some of the small masses adhere, and are dragged off, and thus one pollinium suffices for several stigmas. Insects have frequently been taken bearing pollinia, and often several pollinia are found adhering to the proboscis and head of an insect.

O. maculata, like most of this family, remains barren if insects are prevented from visiting the flowers, and

FIG. 763. CYPRIPEDIUM CALCEOLUS.

Orchid Fertilisation—*continued.*

aid in transferring the pollen is not given. There is no means in this plant of conveying pollen to the stigma, without extraneous help, and the adaptations for cross-fertilisation are complete.

It may, therefore, be regarded as the type of a large section of Orchids, in so far as concerns its entire dependence on extraneous aid, though, in minor points, there is a considerable diversity in the methods of favouring cross-fertilisation; *e.g.*, in *O. pyramidalis*, the sticky disks are united into a concave band, which adheres to the proboscis of the insect visitors. The pollinia pass through the same change of position as in *O. maculata*.

FIG. 764. SINGLE FLOWER OF CYPRIPEDIUM SPECTABILE.

Listera ovata, the "Twayblade," which is an inconspicuous, greenish Orchid, growing in grassy places, has the pollen masses lying immediately above the rostellum. The pollen masses are dry, and, therefore, cannot adhere of themselves to insects; but when the tip of the rostellum is touched, even very gently, by the insect, a drop of sticky fluid oozes out, and fixes the pollen grains

Orchid Fertilisation—*continued.*

in the suitable position to reach the stigmas of the next plant visited. The long, narrow, spurless labellum, secretes honey into a groove down the middle of the upper surface. The insect follows up this guide as it climbs up the labellum, and, on reaching the upper end of the groove, it is almost certain to touch the rostellum, and to have the pollen-masses affixed to its head. For a little the rostellum sinks, and closes the way to the stigmas; but soon it rises, leaving free access to the stigmas for later visitors to the flower. These visitors are attracted by a new supply of nectar in the groove. They are almost all small insects, with the proboscis short or absent, the nectar lying open. The genus *Cypripedium*—represented by *C. Calceolus*, the "Lady's Slipper" (see Fig. 763), a scarce species in England, and by many tropical species, *e.g.*, *C. spectabile* (see Fig. 764)—belongs to a group that possess two fertile stamens, situated at each side, on the lower surface, of a broad, shield-like plate (the representative of the single fertile stamen in other Orchids). This plate overhangs the stigmatic surface, which lies on a prominent overhanging rostellum immediately below the plate. The labellum is much like the front half of a slipper (see Fig. 764). It forms a chamber, open above, and large enough to allow small bees to enter. This they do readily, to gnaw the hairs that line the middle of the floor. The lips on each side are incurved, so that, when an insect wishes to escape by the opening, it cannot crawl out as it entered; nor is there room for it to fly out. But, at the stalk of the labellum, a small opening is left on each side, where, if strong enough, by squeezing between the labellum and the stigma, and then between the labellum and either stamen, the prisoner can escape, carrying away one of the pollinia. As the stigma is touched before the anther, the flower cannot be fertilised with its own pollen, but only with that from one previously visited. Few flowers are formed on each plant.

Among exotic Orchids, the adaptations for fertilisation by pollen from other flowers are far more curious and striking even than the above, and the peculiarities in form and structure of the rostellum, the pollinia, and other parts of the flower, are often very strange, and cause them to resemble insects (*e.g.*, in the Fly Orchis), or a minute dove, or other objects too numerous to describe, or even to mention.

Mr. Darwin has described fully some of the more remarkable, among which is the extremely curious genus *Catasetum*. In this genus of Orchids, the flowers are of different sexes, and they are so unlike that on *C. tridentatum* three supposed genera were based; the characters being drawn from the form of the flowers. These were *Catasetum*, based on the male; *Myanthus*, on the hermaphrodite; and *Monachanthus*, on the female flowers. The occasional presence of these flowers on the same plants has enabled botanists to understand their mutual relations. Cross-fertilisation must be effected before seeds can be formed; and this requires insect agency. In *Catasetum* (the male flower), the labellum rises up at the back of the flower (the ovary not making the usual half-twist), and is shaped like a monk's cowl. It contains no exuded nectar, but bees and other insects gnaw the inner surface greedily. The central column projects forward below the labellum, and bears the anther on its upper surface, the pollinia and disk being embedded in the tissues till set free by the mechanism now to be described. From each side of the rostellum grows a long, slender, curved horn,

Orchid Fertilisation—*continued.*

or "antenna"; and both lie within the hollow of the labellum. The right antenna occupies the bottom of the space, with its tip just projecting beyond the left margin; the left one curves upwards along the back of the labellum.

The slightest touch on either antenna immediately transmits some stimulus to the membrane over the disk of the pollinia, causing it to be rent; the disk springs out, by sudden removal of tension from the bent caudicle, and the whole mass is thrown forward, with the sticky disk in front, against the insect, if the antenna has been touched by an insect, and at once adheres in the position most likely to secure conveyance to the stigma of the female flower. The pollinia are not sensitive to contact of insects with any part of the flower except the antennæ; but the position of these organs renders this contact almost certain to occur when the labellum is being gnawed. The female flowers of this species (formerly called *Monachanthus viridis*), resemble the male flowers in the position and general form of the labellum, which differs only in minor details. The column also agrees in position, but is smaller; the pollinia are rudimentary; the disk does not cohere with the pollinia, but soon falls away; and the antennæ are absent. On the other hand, the stigmas and the ovaries are developed, and the seeds ripen abundantly.

The form called *Myanthus barbatus* is very different in appearance from the other two, and Darwin points out that it comes near, in its structure, to the flowers of *Catasetum callosum* and of *C. saccatum*, but that it is hermaphrodite, though not known to seed. He suggests that it may be a reversion to the ancestral form. Owing to a bend in the ovary, the column and the long-fringed

FIG. 765. FLOWER OF CATTLEYA BICOLOR.

Orchid Fertilisation—*continued.*

labellum have reversed the positions they occupy in the other forms. In the large group of *Epidendreæ*, of which so many are cultivated in hot-houses, the adaptations for cross-fertilisation, though less complex than in *Catasetum*, well deserve a short notice. *Cattleya* is selected as an easily-obtained type; but *Lælia*, *Chysis*, and other genera, only differ from *Cattleya* in minor details. The positions of the labellum and of the column will be readily made

FIG. 766. CATTLEYA TRIANÆ.

out (see Figs. 762, 765, and 766). The column is prominent, and arches forward, having the stigmas on the front or lower surface, near the tip. Just beyond them is the rostellum, the lower surface of which is thickly covered with sticky liquid. Beyond this, again, on the tip, is the anther. The pollen grains are joined to form four chief masses, which end in caudicles, to which many separate small groups, each of four grains, are stuck. The caudicles have no disks; they lie so that their tips are on the dry, membranous, upper surface of the rostellum. The labellum usually has the sides folded up so as to nearly surround the column. The nectary is a narrow tube between the labellum and the base of the column in front. When an insect of suitable size comes to suck the nectar, it must push its way between the labellum and the front, or lower, surface of the column;

Orchid Fertilisation—*continued.*

and must get well in below the latter before reaching the nectar. In doing this, its back presses against the stigmas, and leaves on them pollen from any previously visited flower. In retreating, the insect presses its back against the lower surface of the rostellum, and becomes smeared with the fluid, some of which is also forced on to the caudicles, and causes them to stick to the insect; and the pollinia are thus drawn out and fixed to it, to be transferred to the next flower visited. It will be observed that the method of affixing the pollinia in these plants reminds us a little of that previously described as occurring in *Listera ovata*; but the larger size renders it more easy to study the process in *Cattleya* and its allies, and the differences in details are sufficiently obvious.

Some Orchids are now so specialised to adapt themselves for cross-fertilisation alone, that the stigma dies (as if poisoned) when pollen from the same flower is placed on it; *e.g.*, species of *Burlingtonia* and of *Oncidium*. Between this extreme and habitual self-fertilisation in cleistogamic flowers, every stage is to be encountered. In many cases, where mechanical obstacles prevent the pollen of a flower being transferred to its stigma, the ovules are well fertilised (*e.g.*, in *Orchis maculata*) if pollen is placed on the stigma of the same flower.

An interesting example of the way in which an Orchid, possessed of structures intelligible in their origin only as suited to cross-fertilisation, is converted by a slight alteration, so as to enable its ovules to be fertilised by pollen of the same flower, is well seen in the Bee Orchis (*Ophrys apifera*). In this plant, the parts are, in many respects, similar to those of *Orchis maculata*; but the pollinia have long, slender, flexible stalks, and the mass of grains in each slips out of the pouch of membrane, and hangs in front of the stigma, retained by the disk, and the slightest swaying movement causes it to strike against the stigma, and to leave pollen on it. The flower is not much, if at all, visited by insects, and it possesses no attractions for them.

A striking anomaly is that observed by Dr. F. Müller, in South Brazil, in which an Epidendrum possessed two lateral stamens that secured self-fertilisation, and a median one, from which the pollen could be removed only by insect or other extraneous aid. The rarity with which this is effected, is indicated by the absence of attractions for insects in the flower. A considerable number of self-fertilised Orchids have been put on record. One of the latest papers on this subject is entitled, "On the Contrivances for Insuring Self-Fertilisation in some Tropical Orchids," by Henry O. Forbes, in the "Journal of the Linnean Society," vol. xxi., pp. 538-49, tt. 16 & 17.

ORCHID HOUSE. This term is applied to any garden structure in which Orchids are cultivated, to the exclusion of all, or nearly all, plants of another description. It is not necessary, nor, indeed, always thought advisable, to relegate these plants to certain houses by themselves; but in nurseries, where space for thousands of living imported specimens have frequently to be found, and a large collection of established plants is also grown, not only are special Orchid Houses found necessary, but large structures are frequently devoted wholly to the accommodation of such genera as *Cattleya* or *Odontoglossum* alone. Nor is this system entirely limited to nurseries; many private collections have now become so extensive, in consequence of the frequent additions made, that similar arrangements are being adopted. Where large and varied collections of Orchids are grown, they are usually arranged, according to the

Orchid House—*continued.*

amount of heat required, in three separate houses, or three compartments of one house having the heating arrangements fully under command. When only a mixed collection is grown, the several genera forming it must be afforded positions as favourable to their well-being as circumstances admit, and the temperature varied somewhat by giving a greater or less amount of ventilation in different parts of the house in which they are placed. The following are the names usually given to the three different Orchid Houses, or divisions referred to. Approximate temperatures for each, during summer and winter, are also subjoined, as a general guide for cultivators, and not with the intention of their being rigidly followed:

1. *East Indian House.* To this department are relegated all Orchids requiring the highest temperatures, such as those originally received from the Eastern, and also from the hottest parts of the Western, hemispheres. These plants need plenty of moisture in the air during their season of growth, and also a circulation of air, somewhat cautiously applied, to avoid sudden changes of atmosphere. Temperatures: Summer—day, 75deg. to 90deg., with sun; night, 70deg. to 75deg. Winter—day, 70deg. to 75deg.; night, 60deg. to 65deg.

2. *Brazilian and Mexican House.* This provides accommodation for Orchids which require an intermediate temperature, as, for instance, the bulk of the Mexican species and a number from Brazil, &c. These will succeed in a drier atmosphere, generally, than those already referred to, but shrivelling must not be allowed. Temperatures: Summer—day, 75deg. to 85deg., with sun; night, 65deg. to 70deg. Winter—day, 65deg. to 70deg.; night, 60deg.

3. *Peruvian House.* A division specially for cool Orchids, natives of the mountains of South America, India, &c., many of which never appear to have any fixed season of rest. They are best suited with a cool temperature, and a more or less genial, moist atmosphere all the year round. Temperatures: Summer—day, 60deg. to 70deg.; night, about 60deg. Winter—day, 50deg. to 60deg; night, 40deg. to 50deg., according to temperature outside.

The shape of structure most suitable for Orchid culture, generally, is a span-roof, or something very closely approaching it, such as a three-quarter span. Lean-to houses, with northern aspect, are well adapted for all the cool species and varieties of such genera as *Masdevallia* and *Odontoglossum*, in summer particularly, as these do not succeed in a high temperature, nor in houses where, from sun heat or other causes, the atmosphere is dry at any time of year. Where the ventilation is properly arranged and managed, cool Orchids may be grown as successfully in a structure of another shape as in a lean-to. A span-roofed Orchid House, about 60ft. long, 12ft. wide, and 8ft. high, would accommodate a large quantity of small plants, which could all be arranged on side stages, near the glass, or a large number might be suspended from the roof. The side walls should be carried about 4ft. or 4½ft. above the ground, and small doors or sliding ventilators inserted in them, about half-way up. The top ventilation should be effected by having a longitudinal flap, made to rise up from the inside, or by small sashes attached with hinges to the ridge, and arranged so as to open without admitting rain in wet weather. Running sashes on the roof, and side-sashes opening on a level with plants on the stages, should now be recognised as things of the past when new Orchid Houses are being constructed. If plants requiring various temperatures are to be grown in one house, a glass partition will be the most convenient way of dividing one part from the other, which might have more or less heat and air applied, as found necessary. The dimensions given above would only be suitable for a house in which small or moderate-sized plants were intended to be grown; for specimens of considerable growth, or for large collections, proportionate measurements to any extent might readily be taken to meet requirements. Side stages should be about 4ft. from the ground. A system of having a double staging is sometimes adopted with excellent results for Orchids, namely, a bed of ashes, shingle, coke, or breeze, is laid on slates, which are supported by upright iron pillars. This bed is continually kept moist, and an open woodwork staging is placed above, on which the plants are stood. In some of the best-arranged Orchid Houses, the plants stand over a water-tank, formed beneath the woodwork staging. Into this the rain-water from the roof is conducted, and is always close at hand for watering the plants. It is most important that only rain-water be used for this last-named purpose, if it can possibly be obtained. Orchid Houses should never be built so high that the plants, when arranged inside, will be very far from the glass, or situated so as not to receive a sufficiency of light, which the majority of them require. There are few Orchids, except, perhaps, the Mexican species, that are not benefited by shading in summer. This should not, however, be thick, neither should it be permanently fixed on the roof. A thin shading, sufficient to exclude bright sunshine, while, at the same time, admitting light, is best; it should be tacked on rollers, and kept up during dull weather.

General Remarks on Culture, &c. The special cultural requirements of all the important genera of Orchids being given elsewhere in this work, under their respective headings, it will be unnecessary to add more here than a few brief remarks of a general character. At one time, Orchids were limited to the gardens of a comparatively few wealthy owners, who took an especial interest in them, and spared no expense in obtaining such plants. The same conditions exist up till the present, in respect of rare specimens, or those of exceptional merit; but some representatives of the more popular genera are, fortunately, now found almost everywhere. This is mainly the result of enterprise, shown by sending collectors of plants to remote foreign lands, where Orchids abound, for the purpose of seeking new additions to the species, or varieties, already obtained, and for transmitting, in quantity, well-known and popular kinds, for distribution in this country. The method of culture, too, has been much modified, since it was found that the plants, in general, did not really require so much heat as what was, at first, thought necessary. Orchids are able (especially many of the strong-growing species) to withstand a considerable amount of ill-usage, compared with many other plants; otherwise, so many thousands would never reach this country and re-establish themselves in the way they do. Heat and moisture afford nearly all the plants need, consequently, the proper method of applying these is, at least, one of the main points in successful culture. Good fibrous peat, living sphagnum, and charcoal, form the principal materials necessary for the majority of Orchids. These are of more use for holding the plants in position, and retaining moisture for the encouragement of the tender roots, than for any particular nourishment afforded. It is remarkable how some attach themselves to a block of wood and succeed admirably with nothing else, save a little sphagnum and the proper attention in watering. Pots for Orchids should, with few exceptions, be quite half-filled with clean drainage, and they should be used as small as possible, in proportion to the size of plant. Shallow pans, made in various sizes, either for suspending from the roof or for standing on stages, have been used very extensively of late, with most excellent results. Orchid baskets should be made of teak wood, as it is hard, and lasts a long time. They may be purchased in

Orchid House—*continued.*

several sizes, ready for use. Blocks, or rafts, may also be made of teak, or pieces of tree-fern will frequently answer equally well. A moist atmosphere is most desirable for all during the summer, or growing season, and, as a rule, plenty of water at the root. The amount of rest necessary varies considerably, and can only be properly apportioned by experience with different genera or species; some (as already remarked) are seldom completely at rest. Heavy syringing is not recommended at any season: a very slight dewing over the plants may be advantageous in summer; but, further than this, the use of a syringe should be limited to distributing water amongst the pots for moistening the atmosphere. Cleanliness amongst Orchids, in every respect, is one of the main roads to success. Dirt on the plants, or the pots, in the drainage, or even on the beds beneath, will soon produce an evil effect on the healthy appearance that should, and generally does, characterise Orchids receiving proper attention.

Insects, &c. Orchids are subject to many insect pests, and to a much-dreaded disease called the "spot." This latter is considered to be encouraged, especially in winter, by a superabundance of moisture and by a stagnant atmosphere. White and Brown Scale, Mealy Bug, Yellow and Black Thrips, Red Spider, Yellow and Green Fly, are all included in the insect pests to the attacks of which the plants are at times liable. Sponging with weak soft soap or tobacco water is recommended for eradicating any of them: fumigating Orchids is a practice not to be approved of, as it undoubtedly causes injury at times. Cockroaches, Slugs, and Snails, must also be included amongst the enemies of Orchids.

ORCHIDIUM. A synonym of *Calypso*.

ORCHIS (the ancient name, from *orchis*, testiculus; referring to the two oblong tuberous roots of some of the species). Including *Anacamptis*, *Barlia*, and *Himantoglossum*. ORD. *Orchideæ*. A large genus (nearly eighty species) of hardy terrestrial orchids, natives of Europe, temperate Asia, and North Africa, with two North American, and two in the Mascarene Islands. Many of them are interesting and curious rather than showy. Flowers in dense or loose, sessile spikes, or in very short, pedicellate racemes; sepals and petals nearly equal; lip three (rarely four or five) lobed, larger than the petals, hanging down anteriorly between the lower segments of the calyx, and extended in the form of a spur; anther confluent with the column, cells two, diverging at the base; pollen-glands in a common pouch. Stem erect, herbaceous, leafy at the base. The few species worth cultivating thrive best in a deep rich soil; those which naturally prefer chalky soils should be planted in one of similar nature. They are very impatient of disturbance at the roots. Propagated by division. Transplanting should only be performed during the autumn months, when the growth of the young roots will have fully matured.

O. foliosa (leafy).* *fl.* purple, numerously disposed in an ovate or oblong-ovate spike, about 9in. long and 3in. broad; sepals erect, ovate, blunt; petals similar in form, but narrower and smaller; lip pendent, very broad, three-lobed, much longer than the spur. May. *l.* unspotted, oblong, lower ones blunt. *h.* 1½ft. to 2½ft. Madeira. A very desirable plant, varying a little in size of inflorescence and colour of flowers. (B. M. 5074; B. R. 1701.)

O. fusca (brownish). A synonym of *O. purpurea*.

O. hircina (goat-scented). Lizard Orchis. *fl.* dirty greenish-white, with a disagreeable smell, large, remarkable for their long, linear lip; sepals converging over the column; petals small; spike dense, 4in. to 8in. long. Summer. *h.* 1ft. to 2ft. Europe (Britain, East Suffolk and Kent; almost extinct), North Africa. See Fig. 767. (Sy. En. B. 1448.)

O. h. romana (Roman). In this variety, the lip is rosy-purple. Rome, 1871.

O. lactea (milky). *fl.* purple; sepals very acuminate; lip three-parted, very glabrous, equalling the incurved spur. May. *l.* oval, acute, cuspidate. Barbary, 1815. (B. M. 1932.)

O. latifolia (broad-leaved).* Marsh Orchis. *fl.* purple or red; lip convex, crenate, slightly three-cleft; spur conical; spike dense, many-flowered. June. *l.* lanceolate, broadest near the middle, usually spotted with purplish-black. Stem about 1ft. high. Europe (Britain), Asia. (F. D. ii. 266; Sy. En. B. 1458.)

FIG. 767. FLOWER OF ORCHIS HIRCINA.

O. l. lagotis (hare's-eared). A variety having purple flowers, with darker bands on the lip. Alps of Piedmont, 1869.

O. laxiflora (loose-flowered). *fl.* bright crimson-purple, in a very loose spike, 3in. to 10in. long. Summer. *l.* lanceolate or linear-lanceolate, 3in. to 6in. long, not in a rosette. *h.* 1ft. to 3ft. Europe (Guernsey and Jersey, in wet meadows), 1820. (Sy. En. B. 1456.)

O. longibracteata (long-bracted). *fl.* purple; sepals very obtuse; lip fleshy, crisped at base, four times as long as the thick, conical spur; laciniæ obtuse, crenate; bracts exceeding the flowers; spike long, many-flowered. May. *l.* oblong, narrowed at base. Sicily, 1818. (B. R. 357.)

O. longicornu (long-horned). *fl.* purple, disposed in dense spikes, 6in. to 8in. long; lip striped with lilac. May. *h.* 12in. to 20in. North Africa, 1815. A very handsome species. (B. M. 1944; B. R. 202; S. B. F. G. 249.)

O. longicruris (long-shanked). *fl.* pale purple, in a thick, subcorymbose spike; sepals acuminate; lip thrice as long as the incurved spur; laciniæ all linear, acuminate. May. *l.* oblong-lanceolate, undulated, obtuse. Europe. (S. F. G. 927; B. R. 375, under name of *O. tephrosanthos undulatifolia*.)

O. maculata (spotted).* *fl.* pale purplish or whitish, variously spotted with purplish-brown, and disposed in an ovate spike; lip flat, crenate, three-lobed; spur cylindrical, shorter than the germen. June. *l.* lanceolate, spotted with purplish-brown. Stem 1ft. high, slender. Europe (Britain), Asia. (F. D. vi. 933; Sy. En. B. 1459.)

O. mascula (male). *fl.* rich purple, disposed in a rather loose spike; the two lateral sepals reflexed upwards; lip four-lobed, crenate, having the disk white and spotted. Spring. *l.* chiefly radical, elliptical or lanceolate, usually spotted with black. Europe (Britain), North Africa, and West Siberia. (F. D. iii. 457; Sy. En. B. 1455.)

FIG. 768. FLOWER OF ORCHIS MILITARIS.

O. militaris. Military Orchis. *fl.* numerous, in a dense, oblong spike; sepals usually purple, converging over the petals and column in the shape of a helmet; lip longer, paler, more or less spotted with purple, four-lobed; spur not half the length of the ovary. Spring. *l.*, lower ones broadly oval to oblong. Tubers entire. *h.* 1ft. to 2ft. Southern England. See Fig. 768. (F. D. viii. 1277; S. B. F. G. 163; Sy. En. B. 1452.)

O. Morio (buffoon). *fl.* six to eight, in a loose spike; sepals purplish, arching over the smaller petals and column in the form of a helmet; lip pinkish-purple, pale purple in the middle, with darker spots; spur obtuse, nearly as long as the ovary. Early summer. *l.* few, almost radical, and two or three sheathing scales higher up the stem. *h.* 6in. to 8in. Europe (Britain), West Asia. (F. D. ii. 253; Sy. En. B. 1454.)

RUELLIA MACRANTHA.

Orchis—*continued.*

O. pallens (pale). *fl.* pale yellow; sepals ovate, obtuse; lip round, with three entire lobes; spur twice as long as the lip; spike dense, oblong. May. *l.* obovate-oblong, very obtuse. *h.* 9in. Europe, 1825. (B. M. 2569, under name of *O. sulphurea*; J. F. A. 45.)

O. papilionacea (butterfly). *fl.* purple; sepals oblong, acute; lip crenulate, unguiculate, equalling the conical, incurved, pendulous spur. April. *l.* linear-lanceolate, acute, closely sheathed. *h.* 1½ft. Rome, 1788. SYN. *O. rubra.* (B. R. 1155, and S. F. G. 928.)

O. pauciflora (few-flowered). *fl.* yellow, spicate; lip darker, and sometimes spotted. *l.* linear-lanceolate. Italy, &c., 1844. (R. G. 1149, Fig. 2.)

FIG. 769. ORCHIS PURPUREA, showing Habit, and (1) Front and (2) Side View of detached Single Flower.

O. purpurea (purple).* *fl.* ¾in. across; sepals and petals green and purple outside, paler inside, spotted; lip pale rose, spotted with purple; spikes usually large, many-flowered. May. *l.* oblong-obtuse, 3in. to 5in. long. Britain. SYN. *O. fusca.* See Fig. 769.

O. pyramidalis (pyramidal). *fl.* rich rose or purplish-red, remarkable for their slender spur, longer than the ovary; sepals lanceolate, spreading; petals converging over the column; lip broad, three-lobed; spike dense, 2in. to 4in. long. Summer. *l.* lanceolate, usually narrow, and pointed. Stem 1ft. or more high. Tubers pointed. Europe (Britain), North Africa. SYN. *Anacamptis pyramidalis.* (F. D. xii. 2113; J. F. A. 266; Sy. En. B. 1449.)

O. rubra (red). A synonym of *O. papilionacea.*

O. sambucina (Elder-scented). *fl.* yellow or purple, in a dense oblong spike; sepals slightly obtuse; lip obsoletely trilobed; spur pendulous, inflated, twice as long as the lip. April. *l.* ovate-oblong, very obtuse. *h.* 9in. Europe, 1825. (J. F. A. 108; S. B. F. G. 199, under name of *O. Schleicheri.*)

O. Schleicheri (Schleicher's). A synonym of *O. sambucina.*

O. spectabilis (showy). *fl.* few, on a four-angled scape; sepals and petals all lightly united to form the vaulted galea, or upper lip, pink-purple; the ovate, undivided lip white. May. *l.* two, oblong-obovate, shining. *h.* 4in. to 7in. United States, 1801. (L. B. C. 78.)

O. sulphurea (sulphur). A synonym of *O. pallens.*

O. tephrosanthos (ash-colour-flowered). *fl.* purple, variegated, in a thick, cylindrical spike; sepals acuminate; lip twice as long as the incurved spur; laciniæ linear. April. *l.* oblong-lanceolate, slightly acute. (B. M. 3426.)

O. tridentata (three-toothed). *fl.* pale purple, in a corymbose spike; sepals very acuminate; lip equal to the spur; laciniæ denticulate. May. *l.* oblong-lanceolate, acute. *h.* 9in. South Europe, 1818. (B. R. 367.)

O. ustulata (scorched). *fl.* in a dense spike, the deep purple of the unexpanded ones imparting a burnt, or scorched, appearance; sepals deep purple, pointed, converging over the column and the small, narrow petals; lip white, purple-spotted, four-lobed; spur very short; spike 1in. to 2in. long. Spring or early summer. *l.* few, oblong or lanceolate. Tubers entire. *h.* 6in. to 8in. Europe (Britain), West Siberia. (Sy. En. B. 1450.)

ORCHIS, BEE. *See* **Ophrys apifera.**

ORCHIS, FLY. *See* **Ophrys muscifera.**

ORCHIS, HUMBLE-BEE. *See* **Ophrys bombilifera.**

ORCHIS, LIZARD. *See* **Orchis hircina.**

ORCHIS, MARSH. *See* **Orchis latifolia.**

ORCHIS, MILITARY. *See* **Orchis militaris.**

ORCHIS, SPIDER. *See* **Ophrys aranifera.**

ORELIA. A synonym of *Allamanda.*

OREOCHARIS (of Decaisne). A synonym of **Mertensia** (which *see*).

OREOCOME. Included under **Selinum** (which *see*).

OREODAPHNE. A synonym of **Ocotea** (which *see*).

OREODOXA (from *oreos*, a mountain, and *doxa*, glory; referring to the lofty stature of some of the species). ORD. *Palmeæ.* A small genus (five species have been described) of elegant, unarmed, stove, tropical American palms, with slender, ringed stems, bearing large, terminal leaves, with long, sheathing stalks, forming a cylinder around the summit. Flowers white, small, monœcious, the spikes inclosed in double, somewhat woody spathes. Fruit ovoid or oblong-ovoid. Leaves equally pinnatisect; segments narrow, linear-lanceolate, narrowed at apex, unequally bifid, pinnate. The species thrive best in a compost of loam, with a little peat and sand. They are admirably adapted for growing in sub-tropical gardens, where some shelter from winds will be needed, and also for decorating apartments. For general culture, *see* **Phœnix.**

O. granatensis (New Grenadan). *l.* pinnate, with long, narrow segments, which are more or less drooping. Stem smooth. Columbia, 1879. An elegant species, admirably adapted, when in a young state, for table decoration.

O. oleracea. Cabbage Palm. *l.* pinnate, 4ft. to 6ft. long, gracefully arched; segments 1ft. to 2ft. long, bright dark green. Stem slender, swollen at the base, freckled with blackish-brown. *h.* 100ft. West Indies, 1844.

O. regia (royal).* *l.* pinnate, 3ft. to 6ft. long, the segments 6in. to 12in. in length, and nearly 1in. broad, bright green. Cuba, 1836. A very graceful, slender-growing species.

FIG. 770. OREODOXA SANCONA.

O. Sancona (Sancona). An easily cultivated and handsome species, with the leafstalks a reddish-bronze when young. It is used, on the Continent, like Cocos and Chamædoreas, for the decoration of apartments. Tropical America. See Fig. 770.

O. ventricosa (ventricose). A synonym of *Gaussia Ghiesbreghtii.*

OREOPANAX (from *oreos*, a mountain, and *Panax*; alluding to the relationship of the plants to *Panax*, and their natural habitats). ORD. *Araliaceæ*. A genus of glabrous or tomentose, stove shrubs or trees, allied to *Hedera*. Sixty-four species have been enumerated, but this number may be reduced; they are natives of tropical America, mostly in the region of the Andes. Flowers capitate, racemose, or paniculate, sessile, each provided with two or three bracts; stamens equal in number to the valvate petals; ovary three to five (rarely six or seven) celled, surrounded by as many styles. Leaves entire, palmately lobed or digitately compound; lobes or leaflets entire or argutely toothed. All the species thrive in good loam, and require abundance of water during the summer months. During the dull winter season, when the plants are at rest, but little water will be needed. Propagated by cuttings of the young shoots. The species here described are probably the only ones yet introduced.

FIG. 771. FLOWERING BRANCH AND DETACHED FLOWER-HEAD OF OREOPANAX ANDREANUM.

O. Andreanum (André's). *fl.* in globular heads, arranged in a terminal, erect raceme. *l.* petiolate, elliptic, entire, or roundish or sub-cordiform and sub-trilobed, or palmate with pinnatifid lobes, covered beneath, as well as the petioles and branches, with a reddish, deciduous tomentum. Trunk simple or slightly branched. Andes of Ecuador, 1883. A very ornamental shrub. See Fig. 771.

O. dactylifolium (finger-leaved). *l.* palmate, usually seven-lobed; lobes deeply divided, and measuring from 6*in.* to 18*in.* in diameter; under side clothed with rusty tomentum, upper smooth and deep green. Mexico. An elegant, erect-growing shrub.

O. Epremesnilianum (Count Eprémesnil's). *l.* large, digitate, long-petioled; leaflets seven to nine, the two outer ones oblong, entire, and narrowed at both ends, and the middle ones pinnatifid. 1883. This is probably only a variety of *O. dactylifolium*. See Fig. 772.

O. peltatum (peltate). *fl.* greenish-white, in globose heads, disposed in terminal panicles. *l.* long-stalked, coriaceous, five to seven-nerved, round-cordate or peltate-suborbicular, palmately three to five-lobed; lobes ovate-lanceolate, acuminate, remotely and repandly toothed. Mexico. See Fig. 773. (R. G. 1862, 363.)

Oreopanax—*continued.*

FIG. 772. TIP OF FLOWERING BRANCH AND LEAF OF OREOPANAX EPREMESNILIANUM.

O. platanifolium (Plane-leaved). *fl.*, petals white, tomentose externally; heads sub-globose; raceme paniculate. *l.* petiolate, coriaceous, glabrous and shining above, fuscescent-tomentose beneath, truncate and seven-nerved at base, seven-fid at apex; divisions oblong, acuminate, entire. Stem arboreous. Andes of Peru. SYNS. *Aralia platanifolia*, *Hedera platanifolium*.

FIG. 773. OREOPANAX PELTATUM, showing Habit and detached Portion of Inflorescence.

O. Thibautii (Thibaut's). *fl.* greenish, borne in numerous, globular, stalked heads, arranged on the side of an elongated axis. November. *l.* alternate, stalked, digitate; segments shortly stalked, lanceolate, glabrous. Mexico, 1862. Small tree. SYN. *Aralia Thibautii*. (B. M. 6340.)

O. xalapense (Jalapa). *fl.* greenish; petals glabrous; heads sub-globose; racemes paniculate. April. *l.* long-stalked, digitate; leaflets five to seven, glabrous, shining above, dotted beneath, lanceolate-oblong, acute, narrowed at base, entire, sub-coriaceous. *h.* 6ft. Mexico, 1828. Shrub. SYNS. *Aralia xalapensis* and *Hedera xalapensis*.

ORGYIA ANTIQUA, or VAPOURER MOTH. This is one of the most widespread of injurious insects, and is common even within the limits of London. Its larvæ are at times very hurtful to deciduous trees and shrubs of many kinds. The male moth is shown of the natural size in Fig. 774.

Orgyia antiqua, or **Vapourer Moth**—*continued.*

The body is dark brown; the wings are rusty-brown, with markings of deeper and paler tints, and at the rear angle of each fore wing is a conspicuous white spot.

FIG. 774. ORGYIA ANTIQUA (Male).

The female has the wings reduced to tiny scale-like organs on each side of the heavy, clumsy body, which is covered with woolly, yellowish-grey pubescence. The

FIG. 775. LARVA OF ORGYIA ANTIQUA.

larva is shown of the natural size in Fig. 775. It is covered with yellowish hairs. On the back of the fourth to seventh segments are long tufts of yellow or brown hairs; and on the back of the last segment, and on each side of the head, is a long black tuft of clubbed hairs. The larva may reach 2in. in length. When full fed, it spins, in crevices or among leaves, a slight greyish-brown cocoon of silk, largely mixed with its own hairs, and in this changes into a hairy pupa. The female emerges in autumn, and lays her eggs on her cocoon, where they pass the winter, the larvæ emerging in spring.

Remedy. The best remedy is hand-picking the insects in all stages of development; the larvæ especially are conspicuous.

ORIGANUM (the ancient Greek name, used by Hippocrates). Marjoram. Including *Majorana.* ORD. *Labiatæ.* A genus comprising about twenty-five species of mostly hardy sub-shrubs or herbaceous perennials, for the most part natives of the Mediterranean region, one being indigenous to the Canary Islands, and two or three broadly dispersed over Europe and extra-tropical Asia. Corolla tube included or exserted; limb bilabiate; whorls two, rarely six to ten, flowered, crowded in globose, oblong

Origanum—*continued.*

or cylindrical spikelets, which are solitary or aggregate at the tips of the branches. Leaves small, entire or slightly toothed; floral ones all reduced to bracts. Few of the species have any ornamental value, but the undermentioned are worth growing. For cultivation of *O. Majorana, see* **Marjoram.** All the other species here mentioned are easily raised from seeds, or from cuttings of the young, growing, barren shoots; or by division of the roots. They like a rather dry, warm, well-drained border, and succeed in almost any soil.

O. Dictamnus (Dittany). Dittany of Crete. *fl.* pink, in drooping heads. Summer. *l.* broad-ovate, obtuse, quite entire, rounded at the base, thick, clothed with dense wool on both surfaces. Branches ascending. *h.* 1ft. Crete, 1551. A very pretty, but rather tender little sub-shrub. (B. M. 298.)

O. Majorana. Garden, Knotted, or Sweet Marjoram. *fl.* purplish or white; spikelets oblong, sessile, glomerate on the branchlets. June. *l.* petiolate, oblong-ovate, obtuse, quite entire, tomentose on both surfaces. Branches nearly glabrous, racemosely panicled. *h.* 1ft. to 2ft. North Africa, 1573. SYNS. *O. majoranoides* and *Majorana hortensis. See also* **Marjoram.**

O. majoranoides (Marjoram-like). A synonym of *O. Majorana.*

O. Maru (mastic), of Sims. A synonym of *O. microphyllum.*

O. microphyllum (small-leaved). *fl.* pink; spikelets few, globose, disposed in small, loose corymbs at the tips of the branches. June. *l.* small, remote, petiolate, broadly ovate, obtuse, round at base. Branches purplish, smooth, filiform. *h.* 1ft. Crete, &c. Sub-shrub. (B. M. 2605, and S. F. G. 573, under name of *O. Maru.*)

O. Onites (Onites). Pot Marjoram. *fl.* whitish; spikelets small, ovoid, numerous, densely corymbose. Summer. *l.* sessile, ovate, serrated a little, rather villous or tomentose. Stems erect, nearly simple, hairy. *h.* 1ft. Mediterranean region, 1759. Sub-shrub. (S. F. G. 572.)

O. sipyleum (Mount Sipylos). *fl.* pink; spikelets oblong, solitary, or by threes, drooping. Summer. *l.* on short pedicels, quite entire; lower ones roundish, hispid or woolly; upper ones ovate, glaucous. Stem decumbent, paniculately branched at top. *h.* 1ft. to 1½ft. Levant, 1699. A very pretty procumbent sub-shrub. (S. F. G. 570.)

O. Tournefortii (Tournefort's). Dittany of Amorgos. *fl.* pink; spikes more dense than in *O. Dictamnus.* August. *l.* sessile, orbiculate, sub-cordate at base. *h.* 1ft. Amorgos, 1788. Sub-shrub. (A. B. R. 537; S. F. G. 569.)

O. vulgare (common). Common or Wild Marjoram. *fl.* purple; spikelets oblong or cylindrical, glomerate, corymbosely panicled. Summer. *l.* petiolate, ovate, obtuse, serrated a little, rounded at the base. Stem erect, villous, herbaceous. *h.* 1ft. to 2ft. Europe, &c. (Britain). (B. M. Pl. 204.)

ORITHALIA. Included under *Agalmyla.*

ORITHYIA. Included under **Tulipa** (which *see*).

ORMOCARPUM (from *ormos*, a chain, and *karpos*, a fruit; referring to the narrow, chain-like pods). SYNS. *Diphaca* and *Rathkea.* ORD. *Leguminosæ.* A small genus (about half-a-dozen species) of tall, often glutinous, stove or greenhouse shrubs, of which one is broadly dispersed between the tropics in Asia and Africa, two or three are indigenous to tropical Africa, and two are Mexican. Flowers yellow, white, or purple-striped, in short, axillary racemes; standard orbicular, ungaiculate. Pods linear, compressed. Leaves sometimes impari-pinnate, with small exstipellate leaflets, sometimes one-foliolate, with a large, acute leaflet; stipules striped. The undermentioned, the only species in cultivation, is a greenhouse evergreen, of strong habit. Young specimens only are adapted to pot culture; the older ones should be placed out in the borders in summer. A compost of peat and loam is the best soil for this plant. Propagation may be effected, in April, by cuttings of half-ripened shoots, inserted in the compost above mentioned.

O. coronilloides (Coronilla-like). *fl.* pale yellow; peduncles many-flowered, axillary. May. *l.* impari-pinnate; leaflets ovate, glabrous, small, sub-sessile, opposite or alternate. Stem arboreous; branches spreading. Tropical Africa.

ORMOSIA (from *hormos*, a necklace; referring to the seeds of *O. coccinea*, which are scarlet, with a dark spot, and are strung for necklaces). Necklace-tree. Including *Macrotropis.* ORD. *Leguminosæ.* A genus comprising about eighteen species of stove, evergreen

Ormosia—*continued.*

trees, natives of tropical Asia and America. Flowers white, lilac, or dark purple, panicled or racemose; standard roundish. Pods oblong, or rarely elongated. Leaves impari- or somewhat abruptly pinnate; leaflets coriaceous, rarely stipellate; stipules small or inconspicuous. Ormosias are most readily raised from imported seeds, or they may be propagated by cuttings of the half-ripened young shoots, inserted in sandy soil, under a bell glass, in bottom heat. The species thrive in a well-drained mixture of turfy loam and leaf mould.

O. coccinea (scarlet). *fl.* blue. June. Pods glabrous, shining; seeds scarlet, with a black spot at one end, resembling beads. *l.*, leaflets somewhat ovate, thick, with revolute margins. *h.* 10ft. to 20ft. Guiana, 1823.

O. dasycarpa (thick-fruited). *fl.* blue, large. June. Pods tomentose. *l.*, leaflets acuminated, glabrous on both sides. *h.* 10ft. to 20ft. West Indies, 1793.

ORNAMENTAL GRASSES. *See* **Grasses, Ornamental.**

ORNITHARIUM. Included under **Sarcochilus** (which *see*).

ORNITHIDIUM (from *ornis, ornithos*, a bird, and *eidos*, like; the upper lip of the stigma is beak-like). ORD. *Orchideæ.* A genus comprising about a score species of stove epiphytal orchids, natives of tropical America, from Brazil to the West Indies. Flowers mediocre, or rather small; sepals sub-equal, free, spreading; petals similar to the sepals, or somewhat smaller; lip affixed to the foot of the column, unguiculate at base; peduncles one-flowered, fasciculate in the axils. Leaves oblong or elongated, thinly coriaceous. Stems, in some species ascending, and in others root-like and branching, sheathed with imbricated scales, and bearing one-leaved pseudo-bulbs. The species described below (probably the only ones yet introduced) thrive in a warm, moist house, and do best in pots of peat fibre, sphagnum, and pieces of charcoal. During summer, they like a plentiful supply of water.

O. coccineum (scarlet). *fl.* crimson, long-pedicellate, fascicled, nodding; sepals and petals spreading, ovate-lanceolate, pointed; lip undivided, ovate-oblong, bluntish, contracted above the base. June. *l.* approximate, linear-lanceolate, blunt, emarginate, 6in. to 12in. long. Pseudo-bulbs oval or roundish, compressed. Stem low, scaly below. Jamaica, &c., 1790. (B. M. 1437, under name of *Cymbidium coccineum*; H. E. F. 38.)

O. densum (dense). *fl.* white, purplish, in very dense, aggregated, axillary racemes; sepals linear-lanceolate, acuminate, carinate; petals rather smaller; lip oblong, undivided, channelled and recurved at apex. *l.* oblong-lanceolate, obtuse, emarginate. Pseudo-bulbs oblong, compressed, axillary, one-leaved. Mexico, 1836. (B. R. 1804, and Ref. B. 105, under name of *Maxillaria densa.*)

O. strumatum (tumoured). *fl.* white, small, solitary; the upper sepal acute. *l.* linear-ligulate. Pseudo-bulbs densely aggregated, one-leaved. Costa Rica, 1875. (R. X. O. iii. 207.)

ORNITHOCEPHALUS (from *ornis, ornithos*, a bird, and *kephale*, a head; in reference to the form of the column and anther). ORD. *Orchideæ.* A genus comprising about a score species of stove epiphytal orchids, only one of which is probably in cultivation, natives of tropical America, from Brazil to Mexico. Flowers frequently small, in scattered racemes; sepals almost equal, free, spreading; petals similar; lip continuous with the base of the short column, the lateral lobes thick and rather broad; peduncles axillary, simple. Leaves fleshy or coriaceous, oblong or linear. The genus is remarkable for the very long, slender rostellum, to which the stalk of the pollen-masses is attached by means of its terminal, glandular disk. This long rostellum, on a side view, is very like a bird's bill; hence the name of the genus. These curious little orchids thrive in a warm, moist house, attached to blocks of teak, &c., and suspended near the glass. In

Ornithocephalus—*continued.*

hot, dry weather, they will require frequently plunging into water of the same temperature as the house in which they are growing.

O. grandiflorus (large-flowered). *fl.* yellow; inflorescence many-flowered. *l.* large, oblong, blunt, acute or obtuse. A fine species.

ORNITHOCHILUS (from *ornis, ornithos*, a bird, and *cheilos*, a lip; referring to the shape of the labellum). ORD. *Orchideæ.* This genus comprises only a couple of species of stove epiphytal orchids, natives of Burmah and the Himalayas. Flowers small, pedicellate, disposed in lateral racemes; sepals spreading, the lateral ones rather broader; petals rather narrower than the dorsal sepal; lip spreading at base of column; lamina two or three-lobed. For culture of the undermentioned species, *see* **Aerides** (with which this genus is sometimes confused).

O. fuscus (brownish). *fl.* brownish-yellow, striped with purple, odorous; sepals oblong, obtuse, lateral ones larger, oblique; petals linear, obtuse; lip cucullate, bilobed, unguiculate, the lobes rotundate, fimbriated, with a conical spur. *l.* oblong, fleshy, acute, obliquely bilobed. Nepaul, 1865. This is the proper name of plant described in this work as *Aerides difforme.*

ORNITHOGALUM (the old Greek name used by Dioscorides, from *ornis, ornithos*, a bird, and *gala*, milk; supposed to be so called because the flowers of some species are white as milk, or hens' eggs). Star of Bethlehem. ORD. *Liliaceæ.* An extensive genus (about seventy species) of hardy, half-hardy, or greenhouse bulbous plants, natives of Europe, the Orient, and Africa, one being found in extra-tropical America. Flowers small or mediocre, disposed in elongated or sub-corymbose racemes; perianth six-parted at base, white or yellow, rarely fulvous, never red or rose-purple. Leaves linear, lorate, or subulate, fleshy-herbaceous or somewhat firm. Many of the species are decidedly pretty and interesting border flowers, of the easiest cultivation. The taller, strong-growing, hardy kinds are suitable for naturalising in the wild garden, &c., whilst others are good pot plants for cool conservatory decoration. Propagated by offsets. The species described below are hardy, except where otherwise stated; several of the greenhouse kinds, though, might fairly be called half-hardy.

O. anomalum (anomalous). *fl.* yellowish; raceme somewhat loose, thirty to forty-flowered; scape slender, terete, pale glaucous-green, 1½ft. long. *l.* very frequently solitary, rarely twin, 1½ft. to 2ft. long, ¼in. thick, fleshy-herbaceous. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 178.)

O. arabicum (Arabian).* *fl.* white, with a black centre, having a distinct, aromatic odour, large; raceme six to twelve-flowered, round or deltoid, 3in. to 5in. long and broad; scape 1ft. to 2ft. long. Summer. *l.* 1ft. to 1½ft. long, ¾in. to 1in. broad. Spain to Greece and Egypt, 1629. This very showy and distinct species does not flower so freely in the open air as do most others. (B. M. 728; B. M. 3179 and B. R. 906, under name of *O. corymbosum.*)

O. biflorum (two-flowered). *fl.* greenish-white; raceme loose, six to twenty-flowered, 3in. to 4in. long, 1½in. to 2in. broad; scape 6in. to 12in. long. April. *l.* four to six, fleshy-herbaceous, linear, 6in. to 12in. long, ¼in. to ½in. broad. Peru, 1832. Greenhouse. (S. B. F. G. ser. ii. 246.) There is a variety of this, *chloroleuca*, with few-flowered, loose racemes. (B. R. 1853, under name of *O. chloroleucum.*)

O. capitatum (headed). *fl.* white; raceme dense, twenty to thirty-flowered, capitate, globose, 1in. to 1½in. broad; scape 6in. to 9in. long. June. *l.* fleshy-herbaceous, linear-lorate, about 1ft. long, ½in. broad. Kaffraria, 1862. Greenhouse. (B. M. 5388.)

O. caudatum (tailed). *fl.* white, green; raceme fifty to a hundred (or more) flowered; scape terete, 1½ft. to 3ft. long. May. *l.* five or six, fleshy-herbaceous, lorate-lanceolate, 1½ft. to 2ft. long, 1¼in. to 1½in. broad. Cape of Good Hope, 1774. Greenhouse. (B. M. 805; Ref. B. 262.)

O. comosum (hairy). *fl.* greenish-white; racemes twelve to thirty-flowered; scape 3in. to 6in. long. July. *l.* five or six, ascendent, 6in. to 9in. long, about ½in. broad; margins obscurely ciliated. South and East Europe, 1596. (Fl. Ment. 67.)

O. corymbosum (corymbose). A synonym of *O. arabicum.*

O. cuspidatum (pointed). *fl.* greenish-white; perianth segments cuspidate; racemes twelve to twenty-flowered, corymbose, 4in. to 6in. broad; scape 3in. to 5in. long. March. *l.* five or six, linear,

Ornithogalum—*continued.*

10in. to 12in. long, ½in. broad. Asia Minor, 1843. (B. R. xxxi. 21, under name of *O. marginatum*.)

O. fimbriatum (fringed). *fl.* greenish-white; raceme corymbose, eight to twenty-flowered; scape pilose, 1in. to 2in. long. February. *l.* six to eight, densely pilose, 6in. to 8in. long, ¼in. broad. Asia Minor, &c., 1820. (B. M. 3077; B. R. 555; L. C. B. vi. 8.)

O. glaucophyllum (glaucous-leaved). *fl.* pure white on the face, green behind, ten to fifteen, corymbose. *l.* five or six, flat, linear, very glaucous, without the central band, 6in. long. Asia Minor, 1875.

O. graminifolium (grass-leaved). *fl.* white; raceme six to thirty-flowered; scape less than 1ft. high. July. *l.* six to eight, linear-filiform, 8in. to 12in. long, ⅛in. broad, dilated at base. Cape of Good Hope, 1794. Half-hardy. (B. M. 972, under name of *O. juncifolium*.)

O. juncifolium (Rush-leaved), of Gawler. A synonym of *O. graminifolium*.

O. lacteum (milk-white). *fl.* white; raceme dense, twenty to fifty (or more) flowered, 6in. or more long, ½in. to 1in. broad; scape erect, 1ft. to 2ft. high. June. *l.* nine or ten, fleshy-herbaceous, ascendent, 3in. to 12in. long, ½in. to 1in. broad. Cape of Good Hope, 1796. Greenhouse. (A. B. R. 274; B. M. 1134; L. B. C. 1159.) Of this species, there is a slender variety, *conicum*, with narrow leaves, bracts, and perianth segments, and a loose raceme. (B. M. 3538, under name of *O. conicum*.)

O. latifolium (broad-leaved). *fl.* white, green at back; raceme fifty to a hundred (or more) flowered, 1ft. to 1½ft. long, 3in. to 4in. broad; scape erect, 1ft. to 2ft. high. June. *l.* five or six, fleshy-herbaceous, lorate, flaccid, 1ft. to 1½ft. long, 1½in. to 2in. broad. Tauria, &c., 1629. (B. M. 876; B. R. 1978.)

O. longebracteatum (long-bracted). *fl.* greenish-white, in a thirty to sixty-flowered raceme; scape 1½ft. to 2ft. long. May. *l.* 1½ft. to 2ft. long, 1in. to 1½in. broad. Cape of Good Hope, 1817. Greenhouse.

O. marginatum (margined). A synonym of *O. cuspidatum*.

O. montanum (mountain). *fl.* greenish-white; raceme six to twenty-flowered, sub-corymbose, 3in. to 4in. long and broad when expanded; scape 2in. to 4in. long. May. *l.* five or six, linear, 5in. to 6in. long, ½in. broad. Italy, 1824. (B. R. 1838, 28; S. B. F. G. ser. ii. 42.)

O. narbonense (Narbonne).* *fl.* milk-white, with a narrow, green stripe on the outside of each segment of the perianth, numerously disposed in a twenty to fifty-flowered raceme, 4in. to 6in. long, 1½in. to 2in. broad; scape erect, 1ft. to 1½ft. high. Spring and early summer. *l.* 1½ft. to 2ft. long, ¼in. to ½in. broad. South Europe, &c., 1810. (B. M. 2510.)

O. niveum (snowy). *fl.* white; raceme somewhat loose, four to ten-flowered, 1in. to 1½in. long; scape very slender, 2in. to 4in. long. May. *l.* five or six, filiform, firm, 3in. to 6in. long, dilated at base. Cape of Good Hope, 1774. Greenhouse. (B. R. 235.)

FIG. 776. RACEME AND UPPER PORTION OF LEAF OF ORNITHOGALUM NUTANS

O. nutans (nodding).* *fl.* white on the upper side, green on the back, forming a loose raceme, drooping, unilateral; scape 8in. to 12in. long. April and May. *l.* four to six, lorate, flaccid, 1ft. to 1½ft. long, ½in. broad. South Europe (naturalised in Britain). See Fig. 776. (B. M. 269; F. D. 912; J. F. A. 301; Sy. En. B 1523.) The variety *Boucheanum* is more showy than the type; it is dwarfer, and has larger flowers. (Flora, 1845, i. 131, under name of *O. chloranthum*.)

FIG. 777. ORNITHOGALUM PYRAMIDALE, showing Habit and detached Single Flower.

O. pyramidale (pyramidal).* *fl.* pure white, marked with a green stripe on the back of each perianth segment, accompanied with coloured bracts, and arranged in a conical cluster, 6in. to 8in. long. Summer. *l.* generally withering before the plant ceases to flower. *h.* 1½ft. to 2ft. Spain, 1752. See Fig. 777.

O. pyrenaicum (Pyrenean). *fl.* pale yellow within, green without; raceme very long; scape upright, 1ft. to 2ft. high, erect. June. *l.* five or six, fleshy-herbaceous, 9in. to 18in. long, ½in. broad. South Europe (naturalised in Britain). (J. F. A. 103; Sy. En. B. 1525.)

O. refractum (refracted). *fl.* greenish-white; raceme five to fifteen-flowered, 2in. to 3in. long and broad; scape 2in. to 4in. long. May. *l.* six to eight, narrow-linear, 6in. to 9in. long, about ⅛in. broad. Hungary, 1820. (S. B. F. G. ser. ii. 58.)

O. revolutum (revolute). *fl.* white; raceme twelve to twenty-flowered, deltoid, 3in. to 4in. long and broad; scape firm, 8in. to 12in. long. May. *l.* four or five, fleshy-herbaceous, lorate, 6in. to 9in. long, ⅓in. to ⅔in. broad. Namaqualand, 1795. Greenhouse. (B. M. 653; B. R. 315.)

O. sororium (sisterly). *fl.* white; raceme sub-corymbose; scape none; perianth 1½in. or more in diameter. *l.* about five, linear-lanceolate-linguiform, glabrous, channelled. Taurus, 1875.

O. thyrsoides (thyrse-like).* *fl.* yellow; raceme dense, twelve to thirty-flowered; scape erect, 6in. to 18in. long. June. *l.* five or six, fleshy-herbaceous, 6in. to 12in. long, 1in. to 2in. broad. Cape

Ornithogalum—*continued.*

of Good Hope, 1757. Greenhouse. See Fig. 778. (B. M. 1164; Ref. B. 20.) There are two or three varieties of this species: in *album*, the flowers are pure white, with a dark centre, and are very numerously produced in fine spikes; in *aureum*, a handsome form (B. M. 190, under name of *O. aureum*), the flowers are of a golden colour; in *flavescens* (B. R. 305), the flowers are saffron-colour; in *flavissimum* (A. B. R. 505), the flowers are of a much deeper yellow than in the type.

FIG. 778. LEAVES AND INFLORESCENCE OF ORNITHOGALUM THYRSOIDES.

O. umbellatum (umbelled).* Star of Bethlehem. *fl.* of a satiny-white on the inside, and green striped with white without, disposed in an umbel or corymb; scape about 6in. high. May. *l.* six to nine, ascendent, 6in. to 12in. long, ⅛in. broad. Europe (naturalised in Britain). One of the showiest and best species. See Fig. 779. (F. D. 1266; J. F. A. 343; Sy. En. B. 1524.)

O. unifolium (one-leaved). *fl.* greenish-white; raceme subspicate, three to six-flowered; scape 3in. to 6in. long. June. *l.* solitary, linear, 3in. to 6in. long, ⅛in. broad. Gibraltar, 1805. (B. M. 935.) Of this species, there is a taller and more robust variety, *concinnum*, with two, rarely three or five, leaves, and an eight to twenty-flowered raceme. (B. M. 953.)

O. virens (green). *fl.* white; raceme dense, thirty to fifty-flowered; scape 1ft. to 1½ft. high, erect, terete. June. *l.* five or six, fleshy-herbaceous, linear-lorate, 1½ft. to 2ft. long, ⅓in. to 1in. broad. Cape of Good Hope, 1823. Greenhouse. (B. R. 814.)

O. vittatum (striped). *fl.* yellow, green at back; raceme loose, six to twelve-flowered, 3in. to 4in. long, 1½in. broad; scape upright, 6in. to 9in. high. June. *l.* five or six, sub-terete, fleshy-herbaceous, 6in. to 8in. long, ⅓in. broad. Cape of Good Hope, 1802. Greenhouse. (B. M. 1329, under name of *Albuca vittata*.)

ORNITHOGLOSSUM (from *ornis, ornithos*, a bird, and *glossa*, a tongue; alluding to the resemblance existing in the petals). SYNS. *Cymation*, *Lichtensteinia*. ORD. *Liliaceæ*. A genus comprising two species (or well-marked varieties) of greenhouse bulbous plants, natives of South Africa. Flowers long-stalked, solitary in the axils of the floral leaves or bracts, in loose, terminal, often few-

Ornithoglossum—*continued.*

flowered racemes; perianth segments distinct, linear or linear-lanceolate. Stem leaves lanceolate or narrow, continuous with the sheath; upper floral ones linear. Stem simple, erect. Ornithoglossums thrive in sandy loam, and require but little care. When growing, they must, of course, be supplied with water; but after flowering, the pots may be stored in a dry, cool place until it is time to repot the following spring. "We find, upon trial, that all the Cape bulbs may be grown with advantage in the open ground, by making up a bed of light, sandy soil, and planting the bulbs from 4in. to 8in. deep, according to their size; they may be planted in April, and, after they have done flowering, may be taken up and kept dry till the following spring, in the same manner as *Tigridia*; or, if left in the ground all the winter, they will require to be covered with some dry litter or old tan, so as to keep the frost from the bulbs" (Sweet).

O. glaucum (glaucous). *fl.* green, edged with purplish-brown, scentless; perianth segments equal, subulate-lanceolate, reflexed, shortly unguiculate; scape leafy, angular. December. *l.* opposite, alternate; radical ones close, largest, channelled, lanceolate, long-acuminate, recurved. Bulb 1½in. high, ovate-pyramidal. *h.* 6in. 1825. (A. B. R. 233; B. M. 994, under name of *Melanthium viride*.)

O. undulatum (wave-leaved). *fl.* green, with purplish markings, nodding, fragrant at night, but scentless during the day; perianth segments narrow-lanceolate, acute, sessile, reflexed a little above the base; scape short and stout, leafy. September. *l.* radical, distichous, lower ones broadest, lanceolate, tapering to a point; margins brownish-purple, undulated. Root a bulb-tuber, large, solid, and covered with a brown shell. *h.* 6in. 1825. (S. B. F. G. 131.)

ORNITHOPTERIS. *See* **Pteris.**

FIG. 779. ORNITHOGALUM UMBELLATUM.

ORNITHOPUS (from *ornis, ornithos*, a bird, and *pous*, a foot; referring to the claw-like legumes or seed-pods). Bird's Foot. Including *Astrolobium*. ORD. *Leguminosæ*. A genus comprising about seven species of small, low-growing, hardy annuals. Flowers small, pink, white, or yellow, in long peduncled heads or umbels. Leaves impari-pinnate. None of the species are worth growing for horticultural purposes. The genus is represented in the British Flora by *O. ebracteatus* (from Scilly and the Channel Islands), with bright yellow flowers, veined with red, and *O. perpusillus*, a widely-distributed species, with white, red-veined flowers.

ORNITHOXANTHUM. A synonym of *Gagea*.

ORNITROPHE. A synonym of **Schmidelia** (which *see*).

ORNUS. Included under **Fraxinus** (which *see*).

OROBANCHACEÆ. An order of leafless, parasitic herbs, of various colours (never green), for the most part natives of Europe, North Africa, and extra-tropical Asia and North America, a few being found between the tropics in Asia, Africa, or mountainous or extra-tropical South America, and one in Europe and South Australia. Flowers hermaphrodite, regular, solitary in the axils of the bracts, sessile or pedunculate, few, or in dense, terminal, crowded spikes; calyx four or five-toothed or lobed; corolla lobes five, often broad, imbricated; stamens four, didynamous, inserted on the corolla tube. Scales alternate, densely crowded or scattered, upper ones bract-like. Stems or scapes erect, short or elongated, simple or slightly branched. Some of the species are agricultural pests, and do great damage, *e.g.*, *Orobanche pruinosa*, on Beans; *O. cruenta*, on Saintfoin; *O. minor*, on Clover; *O. rubens*, on Lucerne; *Phelipæa ramosa*, on Maize, Tobacco, and Hemp. The order comprises eleven genera (the best known being *Orobanche*) and about 150 species.

OROBANCHE (the old Greek name used by Dioscorides, and said to be derived from *Orobos*, Vetch, and *ancho*, to strangle, because the species were supposed to kill the plants on which they grow). Broom Rape. ORD. *Orobanchaceæ*. A very large genus (above 150 species have been described, but the number of those entitled to specific rank may be reduced to about 100, or less) of various-coloured plants, broadly dispersed over the Northern temperate regions of the Old World, rarely found in the tropics or the Southern hemisphere, and scarcely ever in America; six are natives of Britain. Flowers at the axils of the scales, sessile or sub-sessile, bibracteolate or ebracteolate, densely or interruptedly spicate. Scales often acute. The species have no horticultural value. They are, however, decidedly interesting plants; the annual species may be sown together with the seeds of the host plants they particularly affect. Those of perennial duration should be sown near their special host plants; as, however, three years elapse before the young parasites arrive at the flowering stage, it is better to fence off the places where they are sown, and not disturb the ground.

OROBELLA. Included under **Vicia** (which *see*).

OROBUS (the old Greek name used by Theophrastus; it has nothing to do with the present genus). Bitter Vetch. ORD. *Leguminosæ*. An extensive genus of usually hardy, herbaceous perennials, mostly natives of the Northern hemisphere, and now included (by Bentham and Hooker) as a section of *Lathyrus*, from which it differs in having no tendril at the tip of the petiole. For horticultural purposes, however, the two genera are here kept distinct. Many species are very handsome; they thrive in almost any soil, and are readily increased by dividing the tufted rootstocks in spring. Some force readily, and make

Orobus—*continued*.

charming pot plants for cool-house decoration. The species here described are those generally found in gardens.

O. atropurpureus (dark-purple). A synonym of *Vicia sicula*.

O. aurantius (orange-coloured).* *fl.* deep yellow; peduncles elongated, shorter than the leaves. June. *l.* with five or six pairs of lanceolate, bluntish leaflets. Stems simple, angular. *h.* 1½ft. Caucasus, 1818. (S. B. F. G. ser. ii. 198.)

O. canescens (canescent). A synonym of *O. filiformis*.

O. filiformis (thread-formed). *fl.* white, with a tinge of blue; peduncles many-flowered, longer than the leaves. May. *l.* with usually two or three pairs of linear, bluntish, pubescent or dotted leaflets. Stem tetragonal. *h.* 1½ft. South Europe, 1816. SYN. *O. canescens*. (B. M. 3117.)

O. Fischeri (Fischer's). A synonym of *Vicia sicula*.

O. flaccidus (flaccid).* *fl.* purple; vexillum with two prominent obtuse teeth near the middle, which embrace the inner petals; peduncles terminal or axillary. May. *l.* remote, spreading, of two or three pairs of opposite, very long, linear, attenuated, glabrous leaflets, dark green above, paler beneath; stipules large, semi-sagittate. Stem erect. *h.* 6ft. Croatia, &c. (B. M. 2937, under name of *O. stipulaceus*, and wrongly ascribed to North America.)

O. hirsutus (hairy). *fl.* red; racemes axillary, twice as long as the leaves, few-flowered. May. *l.* ovate, acute, with parallel nerves. *h.* 1ft. Thrace, &c., 1822. (B. M. 2345; S. B. F. G. ser. ii. 302.)

O. luteus (yellow). *fl.* yellow; peduncles elongated, many-flowered, about equal in length to the leaves. June. *l.* with three to five pairs of elliptic-lanceolate, mucronulate leaflets, which are glaucous beneath. Stems simple, angular. *h.* 1ft. to 2ft. Europe, 1759. (L. B. C. 783; S. B. F. G. ser. ii. 115.)

O. niger (black). *fl.* purple; peduncles many-flowered, longer than the leaves. June. *l.*, leaflets elliptic, mucronulate, with almost parallel nerves. *h.* 3ft. Europe (Britain). (B. M. 2261; Sy. En. B. 407.)

O. pannonicus (Hungarian).* *fl.* very variable in colour, ranging from white and cream tinged with rose, to purple and white and yellow; peduncles many-flowered, longer than the leaves. May. *l.* with two or three pairs of linear, mucronate leaflets. Stem simple. *h.* 1ft. South Europe, 1794. (J. F. A. 39; S. B. F. G. 22.)

O. p. varius (various-flowered). *fl.* with the standard rose-coloured, and the keel and wings yellowish; peduncles many-flowered, longer than the leaves. May. *l.* with three or four pairs of linear-lanceolate, mucronulate leaflets. Stems simple, angular. *h.* 1½ft. Italy, 1759. (B. M. 675.)

O. sessilifolius (stalkless-leaved). *fl.* purple, in few-flowered racemes. May. *l.*, leaflets narrow, dark green, almost sessile. *h.* 1ft. Greece, &c., 1823. (B. M. 2796; S. F. G. 692.)

O. variegatus (variegated). *fl.* finely variegated, small. Early summer. *l.* with two or three pairs of lanceolate leaflets. Stems simple, flexuous. *h.* 1ft. Europe, 1821. (S. B. F. G. ser. ii. 28.)

O. vernus (spring).* *fl.* purple and blue, with red veins, the keel tinted with green, the whole changing to blue, secund, nodding; peduncles axillary, many-flowered, shorter than the leaves. Spring. *l.* with two or three pairs of ovate-lanceolate, acuminate, shining leaflets. Stems simple, flexuous. *h.* 1ft. Europe, 1629. (B. M. 521; S. F. G. 691.)

ORONTIEÆ. A tribe of *Aroideæ* (*Araceæ*).

ORONTIUM (the old Greek name for a plant said to grow on the banks of the river Orontes). ORD. *Aroideæ* (*Araceæ*). A monotypic genus, the species being a hardy aquatic perennial, with a deep rootstock. This should be planted in open water, from 6in. to 12in. beneath the surface. Propagated by divisions.

O. aquaticum (aquatic). *fl.* perfect, crowded all over the narrow spadix which terminates the elongated scape; lower ones with six concave sepals and six stamens, upper ones with four; spathe incomplete and distant. May. *fr.* a green utricle. *l.* entire, oblong, nerved, long-petioled. North America. (H. E. F. 19; L. B. C. 402.)

OROPHOMA. Included under **Mauritia** (which *see*).

OROTHAMNUS. Included under **Mimetes** (which *see*).

OROXYLUM (from *oros*, a mountain, and *xylon*, wood; referring to the habitat). ORD. *Bignoniaceæ*. A monotypic genus, the species being a glabrous stove tree, which requires almost unlimited root space for its successful cultivation; it does best when planted out in a well-drained, prepared border of turfy loam, leaf mould, and sand, and the long shoots trained near the glass.

Oroxylum—*continued.*

Propagated by imported seeds; or by cuttings, struck in bottom heat.

O. indicum (Indian). *fl.* whitish, striped with purple, large, fœtid, disposed in long, terminal racemes; calyx large, tubular-campanulate; corolla tube broad, obliquely campanulate, and dilated at throat; limb bilabiate. *l.* opposite, large, bi- or tri-pinnate; leaflets entire, shining. *h.* 40ft. India and the Malayan Archipelago, 1775. SYN. *Calosanthes indica.*

ORPHIUM (named after the mythological personage, Orpheus). ORD. *Gentianeæ.* A monotypic genus, the species being an erect, greenhouse shrub. For culture, *see* **Chironia.**

O. frutescens (shrubby). *fl.* red, showy, in terminal, leafy cymes; calyx loose, tubular; lobes oblong, obtuse, without keels; corolla tube short, sub-rotate. *l.* sessile, linear or oblong, thickish. *h.* 1ft. to 2ft. Cape of Good Hope. (B. M. 37, 707, 818, all under *Chironia.*)

ORRIS-ROOT, or **ORRICE-ROOT.** The root of *Iris florentina.*

ORTGIESIA. Included under **Portea** (which *see*).

ORTGIESIA TILLANDSIOIDES. *See* **Æchmea Ortgiesii.**

ORTHOCERAS (from *orthos*, straight, and *keras*, a horn; referring to the appearance of the outer sepals). ORD. *Orchideæ.* A monotypic genus, the species being a greenhouse, terrestrial orchid, requiring treatment similar to **Disa** (which *see*).

O. Solandri (Solander's). *fl.* in a many-flowered raceme, 6in. long; perianth greenish-yellow, ¼in. long; lateral sepals ¼in. long. *l.* filiform, with long, sheathing bases, rarely linear. *h.* 1ft. to 2ft. Australia and New Zealand. (F. A. O. 1.)

ORTHOCHILUS. A synonym of *Eulophia.*

ORTHOPOGON. A synonym of **Oplismenus** (which *see*).

ORTHOPTERA. *See* **Insects.**

ORTHOS. In Greek compounds, this term signifies straight.

ORTHOSIPHON (from *orthos*, straight, and *siphon*, a curved tube; alluding to the tube of the flower). ORD. *Labiatæ.* A genus comprising about sixteen species of stove or greenhouse perennial herbs, sub-shrubs, or rarely shrubs, mostly natives of the East Indies and the Malayan Archipelago, two or three being found in tropical Africa, and one extending from Malaya into Australia. Flowers pedicellate, slender, or showy; corolla tube exserted; limb bilabiate; stamens four; whorls commonly six, rarely two to four-flowered, in often elongated, distant, or rarely crowded racemes. The undermentioned (probably the only species in cultivation) thrive in a compost of sandy loam and fibry peat. Propagated by cuttings, made of half-ripened shoots.

O. incurvus (incurved). *fl.* pale scarlet; corolla villous, incurved, thrice as long as the calyx; lip spreading; whorls sub-secund. May. *l.* petiolate, ovate or oblong, crenate, pubescent. Stem procumbent at base, ascendent. *h.* 1ft. Eastern India, 1839. Stove evergreen. (B. 173; B. M. 3847.)

O. stamineus (long-stamened).* *fl.* pale lilac-blue, nearly 1in. long, very numerous, arranged in whorls, and these again in racemes at the ends of the branches; stamens projecting a long way. July. *l.* ovate or deltoid, coarsely and irregularly toothed, glaucous below. Stem herbaceous, erect. *h.* 2ft. Tropical Asia, &c., 1869. Stove. (B. M. 5833.)

ORTHOSTEMMA. A synonym of **Pentas** (which *see*).

ORTHROSANTHUS (from *orthros*, morning, and *anthos*, a flower; the flowers expand early in the day). ORD. *Irideæ.* A genus comprising seven species of greenhouse herbaceous perennials, natives of the Andes and extra-tropical regions of South America, or of Western Australia. Flowers often two to many to a spathe, very shortly stalked; perianth tube short, sometimes very short; lobes ovate or oblong, spreading; inflorescence

Orthrosanthus—*continued.*

terminal, simple or branched. Leaves linear or narrowly-ensiform, rigid or grass-like, equitant at base of stem; spathes oblong, sessile or pedunculate. Rhizomes woody, very short. The species mentioned below thrive in a cold conservatory, and in such a structure do best planted out. If, however, it is necessary to grow them in pots, use turfy loam and leaf mould, and insure sufficient drainage. Propagated by division of the tufted rootstocks.

O. chimboracensis (Chimborazo). *fl.* blue, in a lax, narrow panicle, which overtops the root leaves; limb funnel-shaped, ½in. deep. *l.* distichous, grass-like, 1ft. or more long, acute. *h.* 1ft. Peru, 1876.

O. multiflorus (many-flowered). *fl.* of a beautiful sky-blue colour; perianth segments ovate-oblong, uniform; stamens much longer than the style. May to July. *l.* linear-ensiform, about equal to the scape; margins glabrous. *h.* 1ft. Australia, 1820. (B. R. 1090, under name of *Sisyrinchium cyaneum.*)

ORVALA (said to be from *Orvale*, the French name for the Clary—*Salvia Horminum*). ORD. *Labiatæ.* A monotypic genus, included, by Bentham and Hooker, under *Lamium.* The species is a hardy herbaceous perennial, of easy culture. It thrives in a common soil, in any sheltered situation. Propagation may be effected either by seeds or by division of the roots in autumn.

O. lamioides (Dead Nettle-like). *fl.* light purplish-red and white; throat of the corolla inflated, the tube almost straight. April. *l.* cordate, unequally or argutely serrated. Stems slightly coloured. *h.* 1½ft. South Europe, 1596. (B. M. 172, under name of *Lamium Orvala.*)

ORYZA (derived from the Arabic name, *Eruz*). Rice. SYN. *Padia.* ORD. *Gramineæ.* A genus of stove, marsh-loving, rather tall grasses, all East Indian. Nearly twenty species have been described; scarcely five, however, are at all distinct, and these may probably be reduced to varieties of *O. sativa.* Spikelets flat-compressed, one-flowered; glumes four, the two outer ones very small, scale or bristle-like; the two upper ones complicate-carinate; panicle terminal, narrow; branches slender, erect, sub-flexuous, often long and slightly branched. Leaves long and flat. *O. sativa*, the well-known rice of commerce, supplies food for a greater number of human beings than are fed on the produce of any other known plant. It is the principal, and often the only, food of the inhabitants of China, India, and the islands of the Malayan Archipelago. The plants have no horticultural value. They are easily grown, and do best when the pots are plunged in tanks in which tropical aquatics are cultivated.

OSAGE ORANGE. *See* **Maclura aurantiaca.**

OSBECKIA (named after Peter Osbeck, 1723-1805, a Swedish clergyman and naturalist, author of "Dagbock Oefer en Ostendyck, resa," 1757). ORD. *Melastomaceæ.* A genus comprising about three dozen species of handsome stove herbs, sub-shrubs, or shrubs, often erect and setose, natives of the East Indies, China, Japan, the Malayan Islands and Australia, one being found in Africa. Flowers pink, violet, or reddish, showy, terminal, solitary, capitate or paniculate; calyx scaly or pilose; petals five, rarely four, obovate, often ciliated. Leaves sub-coriaceous, sessile or petiolate, three to seven-nerved, entire, or rarely serrulated. For culture, *see* **Melastoma.** The species here enumerated are probably the only ones yet introduced.

O. aspera (rough), of Hooker. A synonym of *O. glauca.*

O. chinensis (Chinese). *fl.* cymose, terminal, few; petals purple, acuminated, longer than the stamens. July. *l.* almost sessile, lanceolate oblong, three-nerved, rather hispid, a little crenulated. *h.* 1ft. to 2ft. China, 1818. Shrub. (B. M. 4026; B. R. 542.)

O. glauca (glaucous).* *fl.* red or purple, on short pedicels, terminal, sub-racemose; calyx with scattered, small, stellate hairs. July. *l.* elliptic, narrowed or obtuse at either end, softly hairy on both surfaces, three to five-nerved. *h.* 2ft. India. Shrub. (B. M. 5085, under name of *O. aspera.*)

O. nepalensis (Nepaul). *fl.* large handsome, in terminal and lateral axillary panicles or corymbs; petals purplish-rose, obovate-

Osbeckia—*continued.*

rounded, spreading. June. *l.* opposite, sessile, lanceolate, often marked with brown spots. Stem 1½ft. high, erect, branched. Nepaul, 1822. Shrub. (H. E. F. 31.)

O. n. albiflora (white-flowered). A pretty white-flowered form. (B. R. 1475.)

O. parvifolia (small-leaved). *fl.* nearly sessile, usually three together; calyx tube and teeth with stalked, stellate, rufous hairs; petals rose-colour, rather large. July and August. *l.* ovate, sub-acute, rather reflexed, three-nerved, nearly sessile, strigose. *h.* 1ft. to 2ft. Ceylon, 1799. Shrub. (B. R. 565, under name of *O. zeylanica*.)

O. rostrata (beaked).* *fl.* rosy-pink, with long, curved, projecting anthers, and disposed in terminal cymes. *l.* oblong-lanceolate, acuminate, bullate, nearly sessile. Stems quadrangular. Bengal, 1881. Shrub. (B. M. 6575.)

O. rubicunda (ruddy). *fl.* deep purple, terminal, on very short stalks, solitary or aggregate; corolla 2in. across; anthers yellow. *l.* oblong, acute. Ceylon, 1865. A very handsome shrub. (B. M. 309.)

O. stellata (starred). *fl.* corymbose; calyx tube elongated; petals four, violaceous; anthers yellow. July and August. *l.* petiolate, ovate-lanceolate, acuminate, five-nerved, beset with stiff hairs on both surfaces. *h.* 2ft. India to China, 1820. Shrub. (B. R. 674.)

O. Wightiana (Dr. Wight's). *fl.* purple, large, fugacious, in close heads. *l.* ovate, small, hairy. Stem hairy. India, 1863. Plant erect, suffruticose.

O. zeylanica (Cingalese), of Lindley. A synonym of *O. parvifolia*.

OSIER. Any of the Willows that are grown for the sake of their long, flexible shoots, which are largely used for basket-making, &c.—and almost any of them may be turned to this account—are called Osiers. Some of the species, however, are much superior to others, and probably the one most extensively grown for the purpose above indicated is *Salix viminalis*. Though this is a moisture-loving plant, it will not succeed in ground charged with stagnant water; and if it is desired to grow it, with a view to profit, the ground should be drained to a depth of 18in. or 2ft. Open drains, about 1ft. in width, will do, but these must always be kept clear. Trench the land 1ft. or so in depth, and insert the cuttings, in rows, 18in. apart, allowing a space of 12in. in the rows. February is, probably, the best time for planting. An acre of land will take about 28,000 cuttings. Cut the shoots—not later than February—as close to the ground as practicable, and keep down weeds by hoeing, &c. If these are allowed headway, the Osier crop will be materially affected.

OSKAMPIA. A synonym of **Nonnea** (which *see*).

OSMANTHUS (from *osme*, perfume, and *anthos*, a flower; in allusion to the fragrance of the flowers). ORD. *Oleaceæ*. A small genus (about seven species) of hardy, or nearly hardy, glabrous shrubs or trees, natives of North America, Eastern Asia, and the Pacific Islands. Flowers small, disposed in short, rarely branched, axillary fascicles or racemes; lobes of corolla four, imbricated. Drupe ovoid or globose. Leaves opposite, evergreen, entire or dentate. For culture, *see* **Olea** (under which the species are sometimes classified).

O. americanus (American). *fl.* in threes, almost sessile; thyrse rather compound, axillary, narrow. June. *fr.* purple, globose, containing an edible nut. *l.* elliptic-lanceolate, about 4in. long, rather coriaceous, shining. Branches rather tetragonal. *h.* 6ft. North America, 1758. Tree.

O. Aquifolium (Holly-leaved).* *fl.* white, very fragrant. Autumn. *l.* oval or oblong, prickly-toothed, coriaceous, smooth, shining,

Osmanthus—*continued.*

somewhat resembling a Holly. Japan. A very handsome, evergreen shrub, varying considerably in the size and toothing of the leaves. (G. C. n. s., vi. 689.) *O. ilicifolius* is a form with smaller leaves, and of more dense, compact habit; of this, there are several variegated forms in cultivation, which may be propagated by cuttings, but are more rapidly increased by grafting on stems of Privet. *O. myrtifolius* is a fixed sport, of dense habit, and with rigid, spineless leaves.

FIG. 780. OSMANTHUS FRAGRANS, showing Habit and detached Tip of Flowering Branch.

O. fragrans (fragrant).* *fl.* yellowish, or almost white; pedicels one-flowered, axillary, and lateral, aggregate from scaly buds. June to August. *l.* elliptic-lanceolate, a little serrated, 2in. long, acuminated, shining above and paler beneath. *h.* 6ft. to 10ft. Japan, China, &c., 1771. A very handsome shrub. See Fig. 780. (B. M. 1552 and L. B. C. 1786, under name of *Olea fragrans*.)

FIG 781. OSMUNDA CINNAMOMEA (see page 530).

OSMODIUM. A synonym of **Onosmodium** (which *see*).

OSMUNDA (from Osmunder, another name of the Scandinavian god Thor). ORD. *Filices*. A small genus (about half-a-dozen species) of handsome, greenhouse or hardy ferns, hardly at all tropical. Sori quite distinct from the leafy part of the frond, forming a panicle made up of copious, thyrsoid clusters. The species in cultivation are generally known as Flowering Ferns, and, with the exception of *O. javanica*, are particularly suitable for the hardy fernery. They thrive best in a compost of turfy loam and peat, to which some river sand may be added. *See also* **Ferns.**

O. cinnamomea (cinnamon).* *sti.* densely tufted, the barren and fertile ones distinct. *barren fronds* simply pinnate, 2ft. to 3ft. long, 6in. to 8in. broad, having stipes from 1ft. to 1½ft. long; pinnæ close, ligulate-lanceolate, 3in. to 4in. long, ¾in. to 1in. broad, cut down nearly to the rachis. *fertile fronds* much smaller; pinnæ lanceolate. Canada to Oregon Mountains, Japan, &c., 1772. Young plants densely clothed with ferruginous tomentum. See Fig. 781 (page 529). Of this handsome species, there is a variety, known as *angustata*, which is smaller in all its parts, and with darker fronds, than the type.

O. Claytoniana (Clayton's).* *sti.* tufted, 1ft. or more long, tomentose when young. *fronds* 1ft. to 2ft. long, 8in. to 12in. broad, the upper, central, or lower pinnæ fertile; barren pinnæ lanceolate, 4in. to 6in. long, 1in. or more broad, cut down nearly to the rachis; fertile pinnæ similar, but shorter; pinnules dense, cylindrical. North America and Himalayas, 1772. A very beautiful species. SYN. *O. interrupta*. See Fig. 782.

O. interrupta (interrupted). A synonym of *O. Claytoniana*.

O. javanica (Java).* *sti.* tufted, 6in. to 12in. long, firm, erect, naked. *fronds* 1ft. to 3ft. long, 8in. to 12in. broad, simply pinnate, the lower or central pinnæ fertile; barren pinnæ 4in. to 8in. long, ¾in. to ¾in. broad, cuneate at the base, and often slightly stalked, the edge entire or sharply toothed; fertile pinnæ shorter, made up of numerous close, but distinct, oblong, sessile clusters. Kamschatka to Java and Ceylon. Greenhouse. SYNS. *O. Presliana* and *O. Vachellii*.

FIG. 782. OSMUNDA CLAYTONIANA.

O. lancea (lance-like). *fronds*, barren and fertile ones distinct, the former about 1ft. long, oblong, shortly acuminate; pinnæ oblong, acuminate, about 5in. long, stalked, the lowest rather reduced; pinnules narrow-lanceolate, 1¼in. long, ¼in. broad, narrowed at both ends, sessile, distinct, slightly toothed upwards. *fertile fronds* ternate-decompound. Japan.

O. Presliana (Presl's). A synonym of *O. javanica*.

Osmunda—*continued.*

FIG. 783. PORTION OF FERTILE FROND OF OSMUNDA REGALIS.

O. regalis (royal).* Royal Fern. *sti.* tufted, 12in. to 18in. long, firm, erect, naked. *fronds* 2ft. to 6ft. long, 1ft. or more broad, bipinnate, the apex fertile; barren pinnæ 6in. to 12in. long, 2in. to 4in. broad; pinnules sessile or slightly stalked, 1in. to 2in. long, ¼in. to ¾in. broad, oblong, blunt, often unequal at the base, the edge finely serrulate; fertile pinnules cylindrical, forming a copious panicle. Britain. This really noble fern is too well known to require any eulogy. See Fig. 783. The form called *cristata* is very desirable, and differs from the type in having the ends of the fronds and all the pinnæ finely crested. Another, *corymbifera* (see Fig. 784), has, also, curiously forked and crested fronds. *O. palustris* is a slender, small-growing form, in which the young fronds are reddish in colour.

O. Vachellii (Vachell's). A synonym of *O. javanica*.

OSSÆA (named after Don Antonio de la Ossa, once Director of the Botanic Garden at Havannah, Cuba). SYN. *Sagræa*. ORD. *Melastomaceæ*. A rather large genus (about forty species) of stove shrubs or subshrubs, confined to tropical America. Flowers usually small, cymose or paniculate; petals four, rarely five. Leaves petiolate, opposite, and ternately whorled, rarely large, entire or slightly toothed. The undermentioned species—probably the only one in cultivation—requires treatment similar to **Melastoma** (which *see*).

O. fascicularis (fascicled). *fl.* white, disposed in many-flowered fascicles; petals taper-pointed. *l.* 4in. to 6in. long, elliptical, tapering at the base, pointed, eminently triplinerved, ciliated and roughish on both sides with scattered, minute hairs. *h.* 6ft. to 10ft. Jamaica.

OSSIFIED. Become like bone—hard, brittle, and close in texture; *e.g.*, a Peach stone.

OSTEOSPERMUM (from *osteon*, a bone, and *sperma*, a seed; referring to the hardness of the seed). Ord. *Compositæ*. A genus comprising thirty-eight species of greenhouse shrubs, sub-shrubs, or rarely herbs, confined to South Africa. Flower-heads yellow, heterogamous, small or mediocre, at the tips of the branches, pedunculate, solitary or loosely paniculate; involucre campanulate or sub-hemispherical; receptacle flat or convex. Leaves alternate, or rarely opposite, entire, toothed, or pinnatifid. The species are probably now lost to cultivation.

OSTRICH FERN. *See* **Onoclea germanica.**

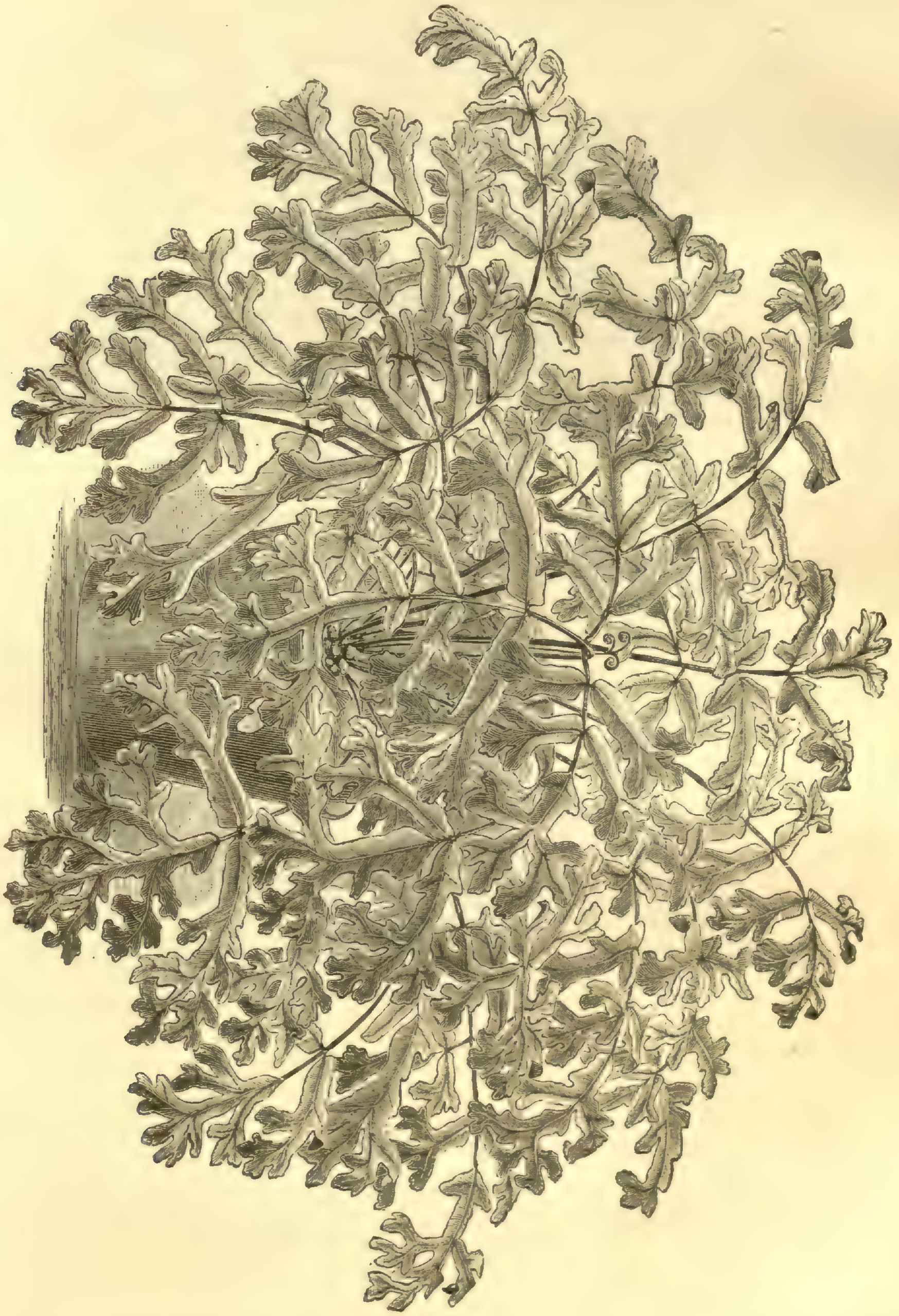


FIG. 784. OSMUNDA REGALIS CORYMBIFERA.

OSTRYA (the old Greek name used by Theophrastus). Hop Hornbeam. ORD. *Corylaceæ*. A small genus (two species) of hardy deciduous trees, closely allied to *Carpinus* in foliage, but having the female flowers in terminal, drooping catkins, each inclosed in an inflated involucre. They are inhabitants of North temperate regions, one being American. Both the species are best grown from imported seeds—for these do not appear to become ripened in this country—or they can be grafted, using the common Hornbeam as a stock. Almost any soil will suit them.

O. carpinifolia (Hornbeam-leaved). Common Hop Hornbeam. *fl.* greenish-white. May. *l.* ovate, acute. *h.* 30ft. to 40ft. South Europe, 1724. SYN. *O. vulgaris* (of Willdenow). (Gn. xii. 372.)

O. virginica (Virginian).* *fl.* greenish-white. May. *fr.* Hop-like, full grown in August. *l.* ovate-oblong, acuminate. *h.* 15ft. to 40ft. Eastern United States, 1692.

O. vulgaris (common), of Willdenow. A synonym of *O. carpinifolia*.

OSWEGO TEA. *See* **Monarda didyma.**

OSYRIS (the old Greek name used by Dioscorides). Poet's Cassia. ORD. *Santalaceæ*. A small genus (five or six species) of greenhouse evergreen glabrous shrubs, natives of South Europe, nearly the whole of Africa, and the East Indies. Flowers small, sub-dicœcious, peduncled; the males in a few-flowered, lateral raceme; the fertile flowers sometimes solitary. Fruit drupaceous, one-seeded, crowned by the limb of the perianth. Leaves narrow or ovate, alternate, entire, papery or rather thick. The undermentioned species, probably the only one introduced, thrives best in a sandy-loam soil. Propagated by cuttings of ripened shoots, inserted under a hand light, in spring.

FIG. 785. FLOWERING BRANCH OF OSYRIS ALBA.

O. alba (white). *fl.* white, pedunculate upon the branchlets. July. *fr.* drupaceous, red, about the size of a pea. *l.* alternate, linear-lanceolate, 1in. long. Stem roundish, striated. *h.* 3ft. to 4ft. Mediterranean region, 1793. See Fig. 785. (S. F. G. 954.)

OTACANTHUS (from *ous, otos*, an ear, and *acanthos*, a thorn; in allusion to the prickly leaves). ORD. *Acanthaceæ*. A small genus (two species) of handsome, erect, branched, pubescent, stove herbs or sub-shrubs, natives of South America. Flowers white or bluish, showy, solitary in the axils, sub-sessile; corolla with a long tube and a bilabiate limb. Leaves entire or toothed. For culture, *see* **Ruellia.**

O. cæruleus (sky-blue). *fl.* bluish-purple, flattish, disposed around the shoot, axillary in the few uppermost leaves. *l.* opposite, ovate-acuminate, strongly serrated. Brazil, 1862. (F. d. S. 1526.)

OTAHEITE CHESTNUT. A common name for *Inocarpus edulis*.

OTAHEITE MYRTLE. *See* **Securinega durissima.**

OTANDRA. A synonym of *Geodorum*.

OTANTHUS. A synonym of *Diotis*.

OTHERA (said to be derived from the Japanese name of this shrub). ORD. *Ilicineæ*. A monotypic genus, included, by Bentham and Hooker, as a species of **Ilex** (which *see* for culture).

O. japonica (Japanese). *fl.* white, axillary, aggregate, on peduncles half a line long; corolla white, with four ovate, obtuse petals. *l.* alternate, petiolate, ovate, obtuse, entire, glabrous, coriaceous, spreading, 1½in. long; petioles semi-terete, glabrous. Stem shrubby; branches purple, striated, terete. Japan.

OTHONNA (the old Greek name used by Dioscorides; from *othone*, linen; referring to the soft, downy clothing of the leaves). Ragwort. Including *Doria*. SYN. *Aristotela*. ORD. *Compositæ*. A large genus (about eighty species) of greenhouse or nearly hardy, glabrous shrubs, sub-shrubs, or herbs, confined to South Africa. Flower-heads yellow or rarely bluish, mediocre or small, pedunculate, corymbosely paniculate or solitary at the tips of the branches; involucre campanulate or hemispherical; receptacle flat or convex, naked or foveolate. Leaves alternate or radical, entire, toothed, or dissected, often somewhat fleshy. Othonnas are of the easiest cultivation; they require a thoroughly well-drained, porous soil—provided the drainage is perfect, the nature of the soil is almost immaterial. They are readily propagated by cuttings. The species here described are those best known to cultivation.

O. amplexicaulis (stem-clasping). *fl.-heads* solitary. May and June. *l.* amplexicaul, oblong, entire or denticulate. Stem shrubby. Root tuberous. (B. M. 1312.)

O. carnosa (fleshy-leaved). *fl.-heads* yellow, in a few-headed subcorymbose panicle; pedicels very long. *l.* linear-terete, fleshy, acute, tapering at base. *h.* 9in. 1867. Sub-shrub.

O. cheirifolia (Wallflower-leaved). A synonym of *Othonnopsis cheirifolia*.

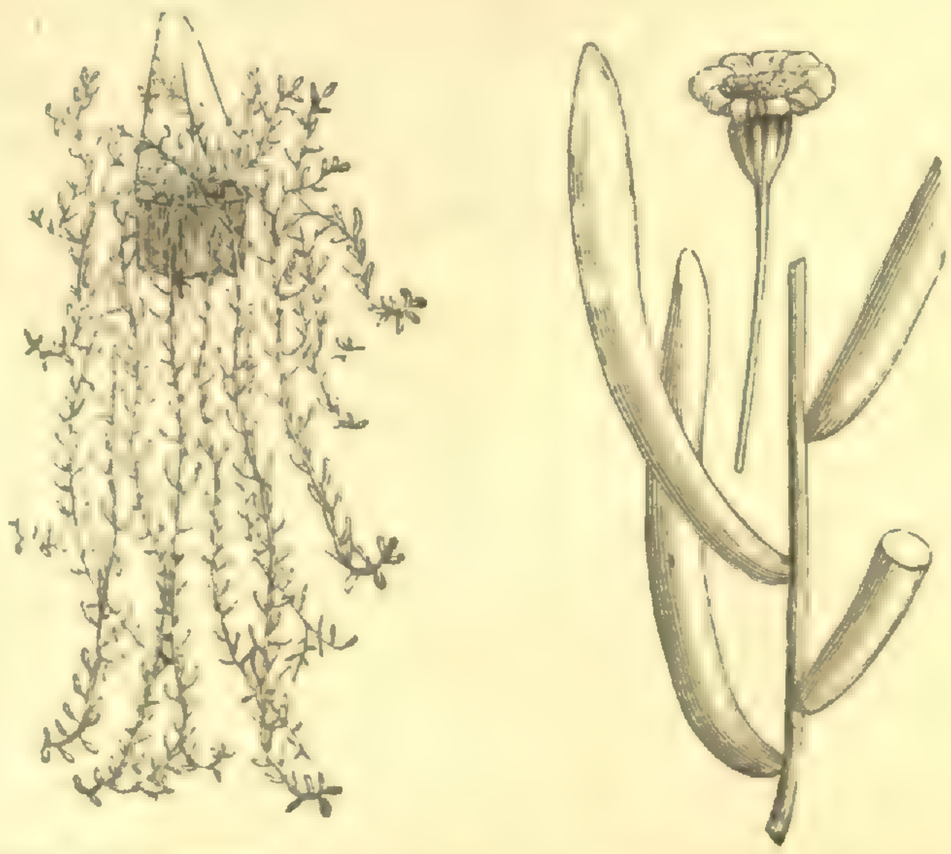


FIG. 786. OTHONNA CRASSIFOLIA, showing Habit, Portion of detached Stem, and Single Flower-head.

Othonna—*continued.*

O. crassifolia (thick-leaved).* *fl.-heads* few, terminal, sub-corymbose; pedicels very long, and slender. A very pretty trailer, and suitable for growing in a basket. See Fig. 786.

O. denticulata (toothed). *fl.-heads* disposed in terminal panicles. April to July. *l.* oblong, denticulated, glabrous, attenuated at base, amplexicaul. *h.* 2ft. 1774. Shrub. (B. M. 1979.)

O. frutescens (shrubby). *fl.-heads* large, in terminal, many-flowered panicles; ray of about eight florets. Late summer. *l.* alternate, obovate, acute, thick, and fleshy. Stem erect, 2ft. to 3ft. high, suffruticose, but succulent. (B. M. 3967.)

O. pectinata (comb-leaved).* *fl.-heads* solitary, twice or thrice as long as the leaves. May and June. *l.* pinnatifid, Wormwood-like, hoary; segments linear, parallel. *h.* 2ft. to 3ft. 1731. An interesting, shrubby plant, readily known by its copious, soft, whitish pubescence. The correct name of this is *Euryops pectinatus*. (B. M. 306.)

O. pinnata (pinnate). *fl.-heads*, ray florets neatly rolled back at night, expanding in the morning. May. *l.* glaucous, obovate, very obtuse, some quite entire, others pinnatifid, with entire, decurrent leaflets. Stem herbaceous. Root tuberous. *h.* 3ft. 1759. (B. M. 768.)

O. triplinerva (three-nerved). *fl.-heads* few or several, loosely corymbose; pedicels very long; involucral scales and rays about five. *l.* crowded towards the apices, obovate, obtuse, tapering at base into a slender petiole. Stem short, sub-simple or forked, shrubby carnose. *h.* 5ft. 1862.

O. tuberosa (tuberous-rooted). *fl.-heads* solitary, rather large, terminal. August. *l.*, radical ones petiolate, broadly ovate or obovate; stem ones few, ovate or oblong. Root tuberous. 1842. Herb. (B. M. 4038.)

OTHONNOPSIS (from *Othonna*, and *opsis*, like; in allusion to the resemblance which exists between the two genera). ORD. *Compositæ*. A genus comprising about eight species of glabrous, greenhouse shrubs, differing from the allied genera, *Othonna* and *Senecio*, in the disk being constantly sterile. One species is North African, another Persian, a third native of Scindia, and the remainder South African. Flower-heads yellow, pedunculate, solitary, or in leafy panicles; receptacle flat or scarcely convex, naked. Leaves alternate, sessile, slightly fleshy, glabrous or slightly toothed. *O. cheirifolia* (probably the only species in cultivation) is a very pretty, low-spreading evergreen, with glaucous leaves. It thrives in almost any soil, but flowers most profusely in light loam, and in a warm situation. A protection of some sort is required in winter. Propagated by divisions, or by cuttings.

FIG. 787. OTHONNOPSIS CHEIRIFOLIA.

O. cheirifolia (Wallflower-leaved).* *fl.-heads* rich yellow, about 1½in. across, terminal; rays acute. Early summer. *l.* greyish, thick, lanceolate, sessile, narrow at the base, broad and rounded at the apex. *h.* 8in. to 12in. North Africa, 1752. See Fig. 787. (B. R. 266, under name of *Othonna cheirifolia*.)

OTIDIA. Included under **Pelargonium** (which *see*).

OTIORHYNCHUS. A genus of beetles, belonging to the group of Weevils, with short beaks, and long-elbowed, twelve-jointed antennæ, inserted in front of the eyes; well-formed elytra, soldered together, with usually ten rows of small, shallow pits or dots along each, no wings, and simple claws. There are numerous species, mostly about ⅛in. to ½in. long, by half as much broad. One or two do not exceed ¼in. in length.

Otiorhynchus—*continued.*

They are all black or brown in colour, with the legs in some black, in others dull red. They are so much alike that it is very difficult to distinguish some of the species from each other. The following are among the more destructive kinds: *O. picipes* (the Pitchy-legged Weevil), ⅓in. long, pitch-brown, or earth-coloured, with the upper surface tubercled, and sprinkled with minute pale grey or yellow scales. Each pit in the rows on the elytra has a whitish scale, like the pupil of the eye, in the middle. The legs and antennæ are usually rather paler than the body; each thigh is toothed. *O. raucus* is much like the last in size, but may be distinguished by a slight ridge down the middle of the thorax, the dots of the elytra being deeper, and not having white scales, by the black body being clouded with yellow and grey pubescence, and by the red-brown legs and antennæ, and the unarmed thighs. *O. sulcatus* (the Black Vine Weevil) is black or dark brown in colour, with greyish-yellow tufts of hair on the deeply-furrowed elytra. The thorax is coarsely tubercled, and has a slight furrow down the middle; the beak is deeply grooved, and the thighs are toothed. This insect measures about ⅝in. in length. *O. tenebricosus* (the Red-legged Garden Weevil) is said to be one of the most destructive, as well as the largest species of the genus, being about ½in. long. It is at first black, dotted with tufts of delicate yellow down; afterwards glossy. The elytra are only slightly striated; the legs are red-brown or chestnut, and the beak is notched at the tip, and faintly ridged. *O. ligustici* is about ⅜in. to ½in. long; it is black, with greyish scales. The thorax and the almost unstriated elytra are finely granulated, and the thighs bear a short tooth. Other species also have been detected injuring plants, but are less common and less hurtful than the above. The species in this genus are destructive both as perfect beetles and as larvæ. The beetles feed on buds or young shoots of Vines, Peaches, Apricots, and other choice fruit-trees, as well as on the young shoots of Raspberries; and Curtis, in "Farm Insects," mentions *O. picipes* as being very destructive to Peas, Turnips, Kale, &c. In consequence of the damage done, the injured parts are destroyed in a short time; and the plants may be killed, or, at least, much crippled, so as to greatly diminish their productiveness. The larvæ are frequently most injurious to the roots of plants of various kinds, such as Raspberries, Strawberries, and other fruit-bearing plants, as well as to roots of a great variety of other plants in gardens; *e.g.*, Primroses, Sedums, Saxifrages, &c., upon the shoots of which the beetles also feed. The larvæ never show themselves above ground; hence, the only sign of their presence is the withering of the plants. They frequently do great harm to potted plants in greenhouses. They become pupæ about 3in. or 4in. below the surface of the soil.

Remedies. As the beetles are wingless, their attacks are usually limited in area, and the damage can be much restricted by suitable means, of which the most successful are those directed against the perfect insects. As all the species have very similar habits, the same methods of destruction apply to all. The beetles conceal themselves by day in holes in walls, or under loose mortar and stones, among dead leaves, in the soil, or in any other convenient retreats, such retreats varying with the nature of the crop attacked by them, and with the habitat. At night, they come out to feed, and, owing to their not possessing wings, they require to creep up the plants to arrive at the young shoots and buds; or else, in the case of Vines, and other plants trained against walls, they may gain access to them by crawling over the walls. Prevention may be secured by the removal of all cover, such as loose mortar on walls, dead leaves, or bark, &c., and stopping up holes in the walls. This should be followed by putting a belt of soft soap, or tar

Otiorhynchus—*continued.*

mixed with oil, round the tree stems, and along the base of the walls against which Vines and other plants liable to injury are trained. Gas-lime on the soil, or soot or lime, would probably be of service, by preventing the passage of the beetles; and these applications, with or without paraffin or carbolic acid solutions, or gas-water, would help to destroy the larvæ in the soil around the roots of plants. Where a Vine border is badly infested, the best course is to remove the soil to a depth of 5in. or 6in. replacing it with new material. Where the beetles are numerous, and destructive to buds and shoots, it is necessary to use means for their capture. They fall very readily off their food-plants when these are shaken, or when a light is brought into their vicinity. Hence, it is advisable to lay cloths or papers, or to invert an open umbrella beneath the plants, which should then be shaken, and the fallen beetles swept together and killed by means of boiling water; or they may be shaken into rough trays tarred inside. When plants turn sickly without evident cause, investigation should be made, and, if larvæ are found, they should be destroyed.

OTOCHILUS (from *ous, otos*, an ear, and *cheilos*, a lip; referring to the small, ear-like appendages at the base of the lip). SYN. *Tetrapeltis.* ORD *Orchideæ.* A genus containing three or four species of stove, epiphytal orchids, natives of the Himalayas and Burmah. Flowers more or less conspicuous than in *Cœlogyne*, loosely racemose; sepals and petals almost equal, free, narrow, spreading; lip sessile at base of column, saccate at base. Pseudo-bulbs proliferous, two-leaved, continuously produced one above the other, each successive one being emitted just below the apex of the old one, and there throwing out a few fibrous roots; rhizome none. The two species mentioned below require an intermediate house, and an abundant supply of moisture when growing. Pot the plants in peat fibre, pieces of charcoal, and sphagnum.

O. fragrans (fragrant). *fl.* white, in erect racemes, 6in. long; sepals linear-lanceolate; petals linear; lateral lobes of lip slightly acute, middle one ovate-lanceolate. June. *l.* shortly petiolate, oblong-lanceolate, 6in. to 8in. long, plicate. Stem ascendent, short, scaly, terete. Nepaul, 1836. SYN. *Tetrapeltis fragrans.*

O. fusca (brownish). *fl.* sweetly scented, disposed in dense, many-flowered, nodding racemes; sepals and petals obtuse; lip golden, tinged with rose; ovary, bracts, column (and rachis) fuscous. August. *l.* linear-lanceolate. Pseudo-bulbs 6in. to 8in. long, 1in. thick. *h.* 9in. Nepaul, 1840. (B. M. 3921.)

OTOSTEMMA. Included under **Hoya** (which *see*).

OTTELIA (said to be derived from *Ottel*, the native name in Malabar). SYN. *Damasonium.* ORD. *Hydrocharideæ.* A genus comprising six or seven species of short-stemmed, stove or greenhouse, aquatic herbs, natives of tropical Asia, Japan, Australia, the Mascarene Islands, tropical and sub-tropical Africa, and Brazil. Flowers hermaphrodite, in a tubular, shortly bifid, solitary spathe, sessile; calyx segments oblong or linear, rigid, membranous; perianth segments much larger, broadly ovate or orbiculate. Leaves clustered, some submerged on short petioles, others long-stalked, floating, ovate-oblong or very broadly cordate. The undermentioned species, the only ones yet introduced, require to be grown in a cistern or pan of water, placed in the stove. Propagation is effected by seeds.

O. indica (Indian). *fl.* white, on radical, naked, one-flowered scapes; perianth segments roundly-obovate, undulately striate, twice as long as the calyx segments. August. *l.* broadly ovate, about 6in. each way, costate-nerved, very brittle. Rootstock and fibres yellow. East Indies, 1800. (B. M. 1201, under name of *Damasonium indicum.*)

O. ovalifolia (oval-leaved).* *fl.*, outer perianth segments green, ¾in. to 1in. long; inner ones pale yellow, 1½in. to 2in. in diameter; spathe about 1½in. long. Summer. *l.* ovate or oblong, 2in. to 4in. long when perfect, obtuse, rounded at the base, scarcely or not at all cordate. Australia.

OTTER MOTH (*Hepialus Humuli*). This insect, which is, perhaps, more widely known by the names "Ghost Moth" and "Ghost Swift," belongs to a well-characterised group of Moths, included under the genus *Hepialus*, which are popularly known as "Swifts," because of the rapid darting flight of most of the species. Five species are native in Britain, the Ghost Swift being the largest and most conspicuous, because of the white upper surface of the wings of the male, and its peculiar hovering flight in the dusk of evening. The attraction to the frequented spot is probably a female, concealed among the herbage, above which the male swings almost with the sweep of a pendulum. The popular name of "Ghost" is due to the colour, and to the sudden disappearance of the insect when it settles down among the herbage.

The Swifts are readily recognised by their antennæ being slender and very short, not reaching to the back of the thorax; and, in addition, the wings are long and rather narrow, with a space between the front and hind pairs, on each side, just at the roots. They all fly in the evening twilight. The larvæ are long, and rather slender; and in colour are greyish or dull yellow, with a brown head, and a brown, horny plate on the back of the second ring of the body. They feed on the roots of many herbaceous plants, burrowing into those large enough to allow of their entrance. They change, in cocoons spun in the larger, or amongst the smaller, roots, into brown pupæ, with long bodies, strongly ringed, each ring bearing short stiff hairs, by means of which the pupæ push their way to the surface of the soil before the moths emerge from them.

The male Otter Moth, in the usual form, as stated above, has all the upper surface of the wings silvery-white, with brown fringes; but, in the Shetland Islands, varieties occur that show all transitions in colour between the ordinary male and the female. The female reaches about 2½in. or 2¾in. in spread of wings, while the male averages only about 2in. The front wings of the female are yellow in colour, with irregular spots, and a broken band near the hind margin, brick-red; the hind wings are dull leaden-grey at the base, tawny near the margin. The larvæ of the Otter Moth, and probably of the common Swift also, sometimes eat roots of Hops, and of a few garden plants, but, fortunately, seldom prove very injurious. The only sign of their presence is the withering of the plants without visible cause.

Remedies. The roots should be examined, and the larvæ of every kind in or upon them should be destroyed. Probably, solutions of paraffin, of carbolic acid, or of other insecticides, would be found beneficial, if the plants were watered with them.

OTTILIS. A synonym of *Leea.*

OURISIA (so called in honour of Governor Ouris, of the Falkland Islands, from whom Commerson obtained the plant). SYN. *Dichroma.* ORD. *Scrophularineæ.* A genus comprising about eighteen species of mostly low hardy perennial herbs, rarely woody at the base; six are natives of New Zealand or Tasmania, and the rest inhabit the Andes or Antarctic parts of South America. Flowers often scarlet or pink, whorled, racemed, corymbose, or solitary; scapes bracteate, one or many-flowered. Leaves chiefly radical, petioled, crenate or entire. *O. coccinea* is a very ornamental plant for growing in patches, and requires a moist and sweet soil, well drained. A position where it must endure exposure to hot sunshine is fatal to it. It is a slow surface creeper, and should be planted freely in frequented parts of the garden. Propagated readily, by divisions of the roots, in early spring. Similar culture will answer for the other species. The two species described here are the only ones seen in gardens.

O. coccinea (scarlet).* *fl.* scarlet, with exserted, cream-coloured anthers, drooping, 1½in. long, in panicled clusters. May to

Ourisia—*continued.*

September. *l.* mostly radical, oval or oblong, unevenly but not deeply notched. *h.* 6in. to 12in. Andes of Chili, 1862. See Fig. 788. (B. M. 5335.)

FIG. 788. OURISIA COCCINEA.

O. Pearcei (Pearce's).* *fl.* crimson, streaked with deep blood-red, tubular, two-lipped, several to a scape. *l.* ovate, coarsely crenated, purplish beneath. Chili, 1863. A handsome species. (F. M. 154.)

OUROUPARIA. A synonym of **Uncaria** (which *see*).

OUVIRANDRA (from *Ouvirandrano*, its native name, said to signify Water-yam; the roots are edible). ORD. *Naiadaceæ.* A small genus of stove aquatics, with tuberculate roots, now included, by the authors of the "Genera Plantarum," under *Aponogeton.* The chief interest of these plants lies in the remarkable singularity of the leaves. The water in which the species are grown should not be above 1½ft. deep. A compost of loam and decayed vegetable matter, in equal parts, is most suitable. The temperature of the water should not exceed 75deg. Propagation may be effected by seeds, or by divisions of the root. The plants, when properly grown, generally sow their own seed.

O. Bernieriana (Bernier's). *fl.* pink, the flower-stem divided into four spikes at the apex. August. Stem much inflated about the middle. Madagascar, 1858. This species resembles the better-known *O. fenestralis* in general structure; the leaves, however, are much narrower and longer, and the nerves are much closer. (B. M. 5076.)

O. fenestralis (window-leaved).* Lace-leaf or Lattice-leaf Plant. *fl.* greenish-white, the flower-stem split at the top into two spikes. August. *l.* 6in. to 18in. long, and from 2in. to 4in. broad, oblong in shape, with an obtuse apex, and spreading out nearly horizontally beneath the surface of the water. The leaves themselves are merely a network of vascular tissue, resembling lace or a lattice-window. Madagascar, 1855. A most singular plant. (B. M. 4894.)

OVAL. Having the figure of an ellipse.

OVARY. The part of the pistil that in the flower incloses the ovules, and in the fruit incloses the seeds. Its true nature will be best understood if we examine the flower of a garden Pea, or of any similar plant. In the centre of the flower, hidden from view by the lower petals, and by a tube formed of the united stalks (filaments) of the stamens, lies the pistil, which, in the order *Leguminosæ*, to which the Pea belongs, consists of a single carpel. To expose it to view, the petals and stamens must be removed; it is then seen to have the form shown in Fig. 789. The part next the stalk (*o*) is broader and greener, and, on being slit open, is found to contain two rows of small bodies, which are the ovules: this part is the Ovary. It becomes narrowed

Ovary—*continued.*

rather abruptly into a paler body (*s*), which is called the style, and which bears at its tip, and for a little distance down the hollow side, a part (*st*) called the stigma, suited by its structure to receive the pollen grains, and to permit of their fertilising the ovules through it. By comparing a ripe pea-pod (Fig. 790)

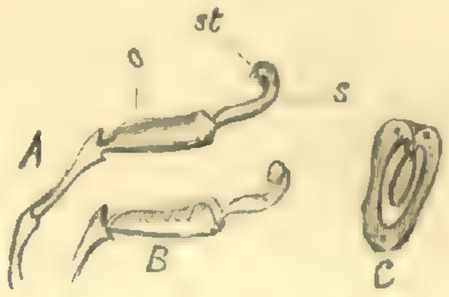


FIG. 789. PISTIL FROM FLOWER OF PEA—A, From the side, natural size, showing (*o*) Ovary, (*s*) Style, and (*st*) Stigma. B, Pistil opened lengthwise, to show a row of Ovules along the Placenta. C, Cross section to show position of Placenta.

with the carpel of the flower, it will bo found that the Ovary has increased very much in size, and that the style and stigma have shrivelled to a mere shred (*s*) on the tip of the pod, but no new parts can be distinguished. The ovules have developed into seeds. In such a carpel as a pea-pod, it is not difficult to

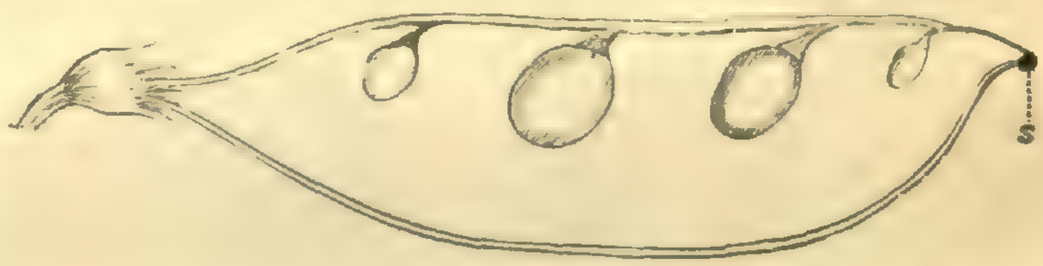


FIG. 790. SMALL PEA-POD, natural size, opened, two Seeds developed, and remains of two unfertilised Ovules; *s*, Remains of Style.

recognise a great likeness to a leaf, folded along the midrib, so that the lower surface is outside, and the upper surface lines the cavity, which is closed by the inturned edges being joined. It is now generally believed that carpels are in reality leaves modified in this way, and that the style is a prolongation of the

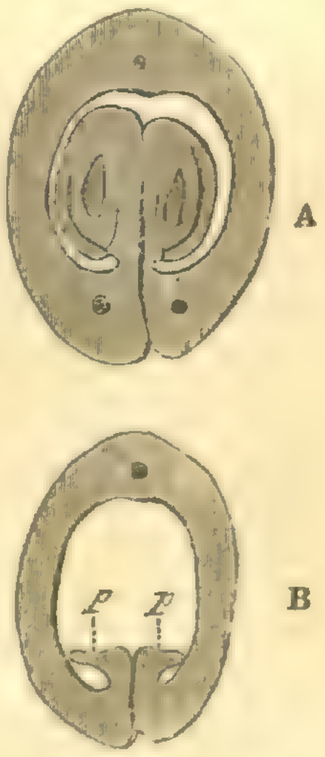


FIG. 791. (A) CROSS SECTION OF OVARY OF ACTÆA SPICATA, with two anatropous Ovules on the Placentæ. (B) CROSS SECTION OF OVARY OF PÆONIA, showing that the Placentæ (*p*, *p*) are the infolded edges of the Carpel.

leaf. Thus, a single chamber is formed, and in it lie all the ovules. The ovules are borne along the two edges of the carpellary leaf, forming a double row, as may be readily seen when a pea-pod is opened. The thickened edges are called the placentæ. The microscopic structure of a pea-pod differs only in details from

Ovary—*continued.*

that of a leaf, and the arrangement of the veins is readily seen to be similar in both. Along the back of the pod (dorsal suture) is a large vein, corresponding to the midrib of the leaf, and along each half of the placenta runs a vein, corresponding to the marginal arched veins in leaves, but strengthened to give a branch to each ovule. The carpel is seen, in the Pea, to be situated nearer the tip of the receptacle than is any other part of the flower. The carpels of *Actæa* (see A, Fig. 791), and of *Pæonia* (see B, Fig. 791), show a very similar cross section to the pea-pod.

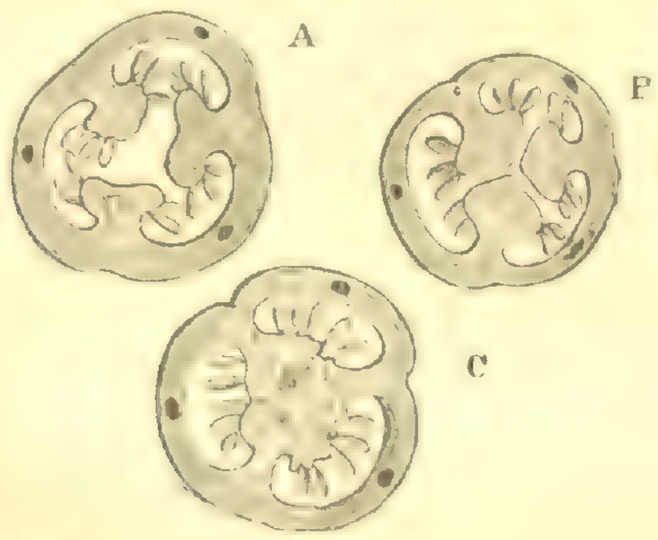
The pea-pod may be taken as an excellent example of a carpel in which the Ovary is quite typically formed, and remains so throughout its growth; but this simple structure of the carpel is widely departed from in various ways, and it is necessary to look now at some of the less typical forms to ascertain to what extent they differ from it.

1. In most plants the pistil is made up of two, or more, carpels. These may be, as in *Pæonia* and *Ranunculus*, free from one another down to the base, or they may be united to any extent, from near the base almost, or altogether, to the top of the Ovary, and even the styles and stigmas may be completely united to each other. The Ovaries may be united only by their outer surfaces, each being closed, and remaining

A B

FIG. 792. (A) CROSS SECTION OF OVARY IN FLOWER OF GOOSEBERRY, formed of two Carpels, joined near their edges, the edges themselves being turned inwards to form the Placentæ. (B) CROSS SECTION OF YOUNG OVARY OF POTATO, formed of two Carpels meeting in middle, and completely united into one mass, with axillary Placentæ.

distinct from the rest internally, or they may open into a central space common to all. The ovules may be borne along the edges of the neighbouring Ovaries, either on projecting upright plates, *e.g.*, Poppy, or in rows along the inside of the wall of the Ovary, as in Gooseberry. In all these cases, it is easy to recognise that the compound Ovary is really made up of as many simple Ovaries as there are placentæ, and that the ovules are borne on the edges of the Ovaries. This



A B C

FIG. 793. THREE CROSS SECTIONS FROM OVARY OF HYPERICUM HIRSUTUM, to show transition in the three united Carpels, from marginal Placentæ in A to axillary Placentæ in C. A is from upper part, B from near middle, and C from base of Ovary.

will be better understood by a reference to Figs. 792, 793, and 794. In all fresh Ovaries, cross sections prove

Ovary—*continued.*

most instructive for study. In the Primrose and its allies, there occurs what is known as free-central placentation; *i.e.*, the Ovules are borne on a head

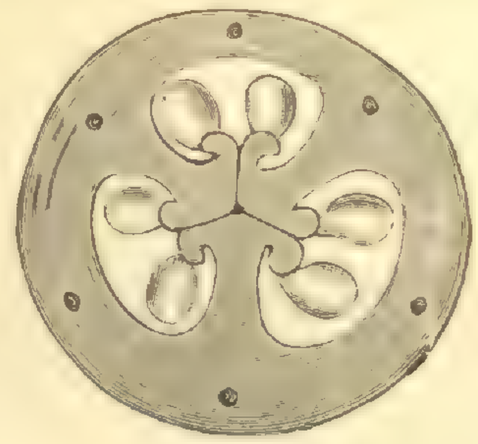


FIG. 794. CROSS SECTION OF OVARY OF FLOWER OF IRIS, showing three Carpels joined at centre into a mass, in which three parts are clearly traceable, each formed of two united Placentæ, each of which bears an Ovule.

(placenta), which looks like a direct growth upwards of the receptacle; and the carpels form only a covering to the head and ovules, which latter do not adhere

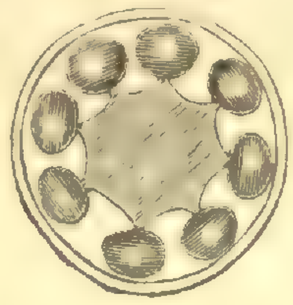


FIG. 795. CROSS SECTION FROM OVARY OF PRIMROSE FLOWER. The Carpels are completely united, and form a ring in the section, quite separate from the free central mass of Placentæ on which the Ovules grow.

to any part of them (see Fig. 795). It is not possible here, in the flower, to tell the number of carpels that unite to form the Ovary, though the number may

A B

FIG. 796. CROSS SECTIONS OF OVARY OF RED CAMPION (LYCHNIS DIURNA)—A, from Flower, showing five Carpels, joined, as in *Iris*, into a central mass bearing the Placentæ, the various Carpels of which are indicated by the dark lines; B, from half-grown Ovary, showing central mass bearing Ovules apparently free, as in the Primrose (remains of broken partitions are seen; otherwise as in A).

be inferred. In *Lychnis* (see Fig. 796), and other *Caryophylleæ*, the structure is almost like that of the Primrose in the mature flower; but it is possible to trace a connection, at a very early stage, between the placentæ and the carpels; and this connection, and the number of carpels, are indicated by lines radiating from the middle of the central mass; and the number of rows of ovules also indicates the number of carpels. The shape of the Ovary, when made up of two or more carpels, usually depends on the number that form it, and is best seen in a cross section of the Ovary made when fresh.

2. Care must be taken not to confound, with truly compound or united Ovaries, a condition sometimes met with—*e.g.*, in *Astragalus* (see Fig. 797), with a simple carpel, and in Flax, with the Ovary composed of several united carpels — in which each carpel is divided, or nearly so, into two cavities, lengthwise, by a partition,

Ovary—*continued.*

which springs from the surface along the midrib of the carpel, enlarging as the seeds ripen.

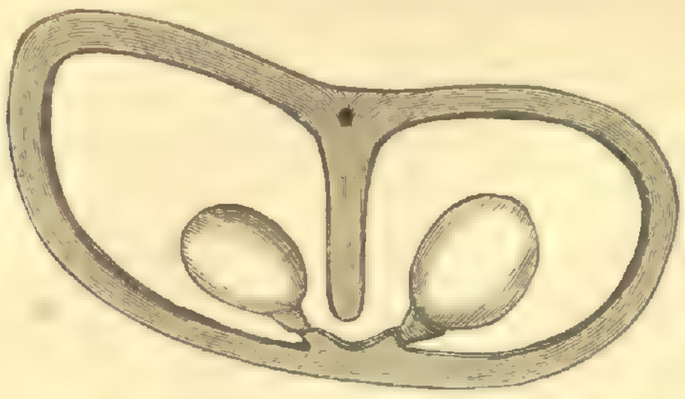


FIG. 797. CROSS SECTION OF NEARLY RIPE POD OF ASTRAGALUS, showing Partition growing from near Midrib towards Placentæ.

3. The typical structure of the Ovary is departed from in some plants, in the growth, after the seeds form, of a number of cross partitions; so that each carpel is made up of a row of divisions, with one seed in each.

4. The typical situation of the Ovary is, as we have seen, at the tip of the flower-stalk (receptacle), or, at least, nearer to it than are the other parts of the flower

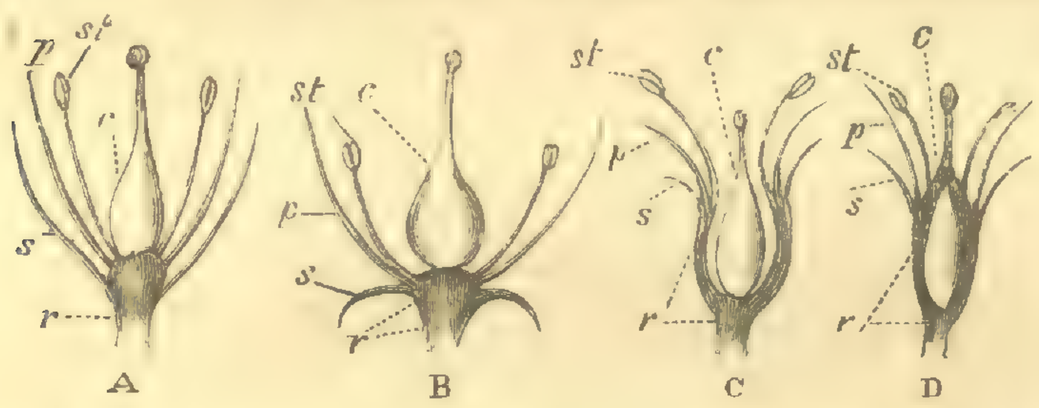


FIG. 798. DIAGRAMS TO ILLUSTRATE MODIFICATIONS OF RECEPTACLE, IN LONGITUDINAL SECTIONS OF FLOWERS. In each the parts shown are—(*r*) Receptacle, (*s*) Sepals, (*p*) Petals, (*st*) Stamens, and (*c*) Carpel, with Ovary, Style, and Stigma. A, Receptacle rounded, with Carpel on tip; B, Receptacle forms a Saucer-like Disk; C, Receptacle forms a Cup around, but not joined to, Ovary; D, Receptacle forms a Cup, united to Ovary, which is sunk in it to near the top. In B, C, and D, the Ovary is at the true tip of the Receptacle, and the Sepals, Petals, and Stamens grow out from the edge of the Disk or Cup.

(see A, Fig. 798). But in many plants the Ovary seems to be more or less completely sunk in the flower-stalk, and to be surrounded by the sepals, petals, and stamens grown together. More careful observation leads to the belief that the receptacle produces, below its apex, a flat ring (see B, Fig. 798) (*e.g.*, in Strawberry), or a cup, which may surround the Ovary (see C, Fig. 798), either (*e.g.*, Cherry) without being united with it, or united to it in part (*e.g.*, Saxifrages), or throughout its whole length (see D, Fig. 798) (*e.g.*, Carrot, *Campanula*, &c.), or even projecting beyond it (*e.g.*, *Fuchsia*),

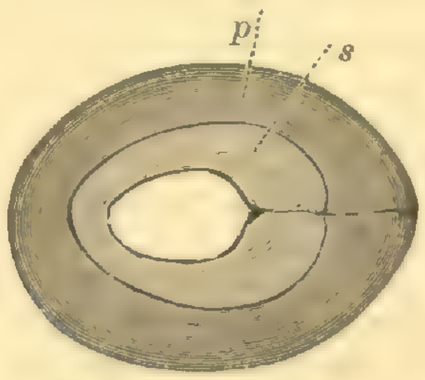


FIG. 799. CROSS SECTION OF HALF-RIPE CHERRY, showing (*p*) Pulpy Flesh and (*s*) Stone. The infolded Edges are clearly seen.

so that it is concealed. Great use has been made of these differences in Systematic Botany, though absolute reliance on them at times tends to separate nearly allied plants.

Ovary—*continued.*

5. Still another mode of departure from the leaf-type shows itself in many Ovaries, as the seeds ripen in them, due to alterations in the texture of their walls. They may become uniformly hard, as in the Acorn, and in the Hazel-nut, or they may become pulpy inside, with a thin, leathery, outer skin, as in the Grape; or there may be a thin, tough, or hard outer skin, a more or less abundant pulpy middle layer, and a hard inner shell, known as the "stone" in stone-fruits (see Fig. 799). This change is frequent both in simple and in compound or united Ovaries. Such differences in structure are best understood with reference to the modes of distribution of the seeds.

The ripe fruit is, in most plants, the Ovary merely enlarged, or changed in one or more of the ways indicated; but in some plants the receptacle also enlarges, either into a fleshy head, as in the Strawberry, or the receptacle cup around the Ovary, mentioned above, becomes fleshy, or, in some form or other, becomes a part of the fruit. The methods of opening, to allow of the escape of the seed, differ greatly in those Ovaries from which the seeds escape when ripe; while one-seeded carpels, or such as have fleshy walls in the ripe condition, usually do not split. The consideration of these differences also belong more to the great subject of the distribution of the seeds than to the subject immediately under notice.

FIG. 800. OVATE AND OBTUSE LEAF.

OVATE. The shape of an egg, with the broad end downwards. An Ovate and obtuse leaf is shown at Fig. 800.

OVIEDA (of Linnæus). A synonym of **Clerodendron** (which *see*).

OVIEDA (of Sprengel). A synonym of **Lapeyrousia** (which *see*).

OVILLA. A synonym of *Jasione*.

OVOID. A solid with an ovate figure, or resembling an egg.

OVULE. The name given to that body which develops into the seed, after it has been acted on by the pollen. The Ovules are contained in the **Ovary** (which *see*) in all flowering plants, except the Coniferous trees and shrubs, the Cycads, so commonly grown in hot-houses, and a few other mostly tropical plants that form the natural order *Gnetaceæ*. The ovary in almost all Phanerogams is closed, so as to entirely conceal the Ovules; but in a few (*see* **Mignonette**) it is open at the top from a very early period.

The Ovules are attached to the placentæ (*see* **Ovary**), to which they are fixed by a stalk, or "funiculus." They are usually very small, and are frequently so translucent as to allow the microscopic structure to be seen, either without special preparation, or, after laying them for a little time in some fluid (*e.g.*, weak solution of caustic potash), to render them more transparent. Others require more elaborate treatment, and must be cut open before they are fit to be examined; but to enter into details would occupy too much space. The description here must, therefore, be restricted to one of the more simple forms of Ovules, afterwards pointing out in what respects, chiefly, other forms depart from this type. The Ovule selected for description is one

Ovule—*continued.*

that remains straight from its earliest appearance till its full maturity, such as is found in the Docks and the Buckwheat. The Ovule first appears like a small,

FIG. 801. THREE STAGES IN GROWTH OF ORTHOTROPOUS OVULE. A, Nucellus alone; B, Inner Coat; C, Both Coats growing up to cover Nucellus.

rounded or egg-shaped swelling (see A, Fig. 801), on the placenta, made up of cells alike in form and contents. This body is usually termed the "nucleus" of the Ovule; but the term "nucellus," now coming into use, is preferable, since "nucleus" should be restricted to the body in the protoplasm of living cells generally known under this name. Round the base of the nucellus a cellular ring (see B, Fig. 801), soon begins to appear, and continues to grow up to form a thin covering around that body. But, while this has been growing, another covering (see C, Fig. 801), forms over it also from below upwards, and the two grow till they leave only a minute opening through them at the upper end (*i.e.*, farthest from the placenta), called the "micropyle," which allows the entrance of a slender tube from the pollen grain. The two coverings are named the inner and the outer coats. At the end next the placenta (see

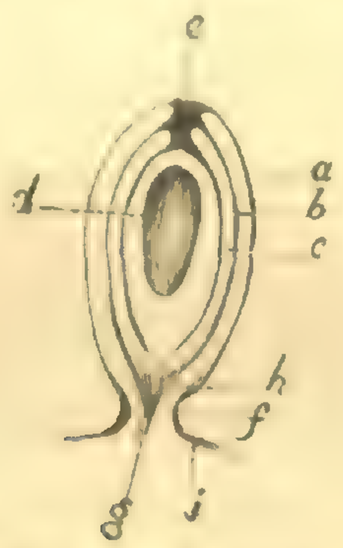


FIG. 802. ORTHOTROPOUS OVULE IN SECTION, showing Two Coats.

Fig. 802), there is, generally, a narrower neck, or there may be a well-formed stalk, or funiculus; though sometimes there is no visible stalk, the Ovule being sessile, or fixed by a broad base. From the woody, or fibro-vascular, bundle in the placenta, a branch runs into the stalk of the Ovule. The part of the Ovule where the coats are grown to the nucellus is the chalaza. At this part, separation takes place when the seed is ripe, and falls from the stalk; and a scar is left, known as the hilum. In the nucellus, a change goes on which results in the formation of a cell—the embryo-sac—very much larger than the others. It lies near the micropyle, from which, in most Ovules, it is separated by one or two layers of cells of the nucellus. It may be almost as long as the nucellus, and may, in course of growth, crush the latter, until all its tissue disappears.

This cell is full of protoplasm; and in the latter may be seen several bodies, as follows (see Fig. 803): At the end next the micropyle are three cells, viz., two rather long ones, known as helper cells; and, at their lower end, a round cell—the embryonal vesicle—from which the embryo is afterwards developed. At the opposite end of the embryo-sac lie three small bodies—the antipodal cells—the use of which is unknown. They are believed to represent a structure that plays an important part in the development of Ferns and their allies, but that

Ovule—*continued.*

has become superseded in the higher plants. In the protoplasm between them lie one or two nuclei, which have to assist in the formation of the endosperm while

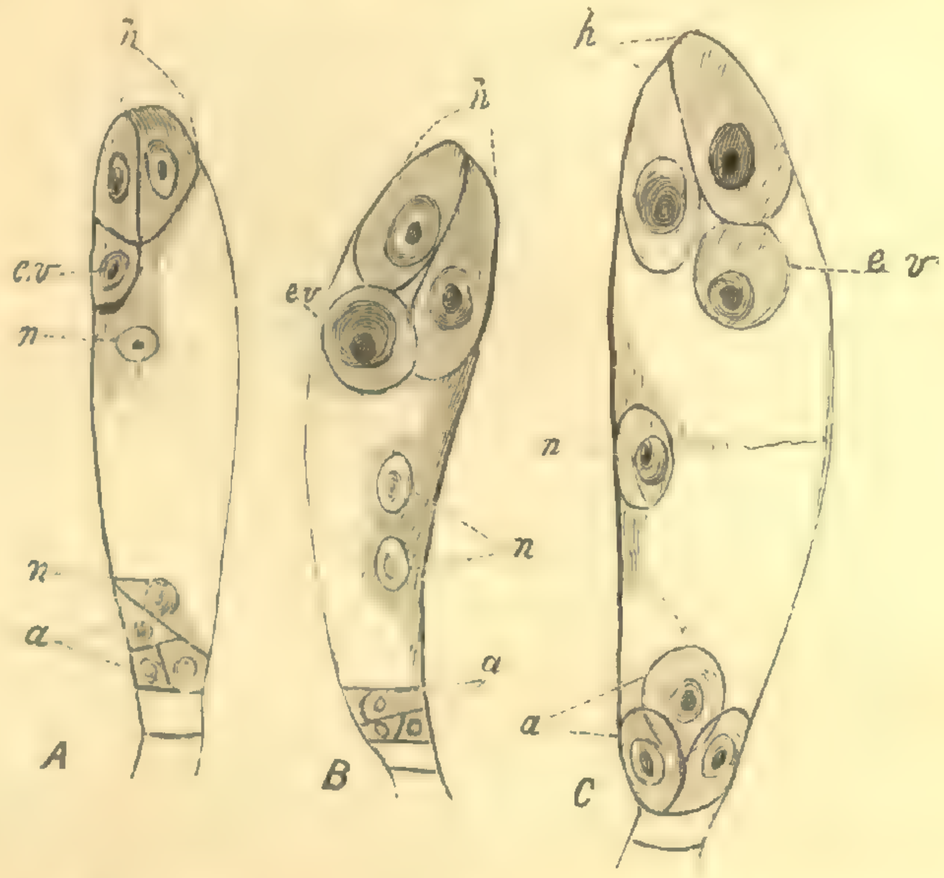


FIG. 803. EMBRYO SAC OF ANGIOSPERM BEFORE FERTILISATION, IN THREE STAGES, showing (*h*) Helper Cells, (*e. v.*) Embryonal Vesicle, (*a*) Antipodal Cells, and (*n*, *n*) Nuclei. In A, the Helper and Antipodal Cells, and the Embryonal Vesicle, are still angular, and the two Nuclei are wide apart; in B, the Embryonal Vesicle is rounded, and the Nuclei lie close together; in C, the Embryonal Vesicle is ready to be fertilised; the two Nuclei are united to form one, and the Antipodal, as well as the Helper Cells, are rounded off.

the embryo, or young plant, is being formed. A brief account of the development of the Ovule into the seed will help to make these various structures more intelligible.

When the stigma is ready to receive the pollen grains, and one of these is placed upon it, the grain very soon, in most plants, pushes a slender pollen tube between the cells of the stigma, down the loose "conducting tissue" of the style, and into the cavity of the ovary, where it finds its way to the micropyle of an Ovule. Passing down this, it pushes the thin coat of the embryo-sac before it, presses between the helper cells, and reaches the embryonal vesicle. It is believed that a part of the protoplasm passes from the tube into one of the helper cells, which then acts in turn upon the vesicle. The helper cells, and, probably, the antipodal cells, disappear; and the embryonal vesicle begins to grow, and to be divided by cell-walls, so that a rounded mass of tissue is formed, attached above to a row of cells, or to a mass in some plants, called the suspensor. The lower rounded mass is the embryo, which increases in size, and shows beginnings of the axis and leaves, or cotyledons. These parts can easily be made out in most plants. In the meanwhile, after fertilisation has been effected, the nuclei in the protoplasm begin to divide, and to form new nuclei, around which cells form, and the embryo-sac becomes filled, more or less completely, with cellular endosperm. This may disappear in the ripening of the seed (*e.g.*, in Beans); or it may remain, and may form a large part of the seed (*e.g.*, in Wheat), in which case it is often called the albumen of the seed.

DEVIATIONS FROM THE ABOVE TYPE OF STRUCTURE AND DEVELOPMENT.

Structure. In many plants (*e.g.*, *Actæa*, *Compositæ*, &c.) there is only one coat on the Ovule (see Fig. 804); in a few (*e.g.*, Mistletoe) there is no coat, the nucellus being exposed in the cavity of the ovary. The funiculus

Ovule—*continued.*

varies much; in some Ovules it is very long (see Fig. 805), while others do not possess it. Most Ovules have it closely adherent to one side, the Ovule being in-

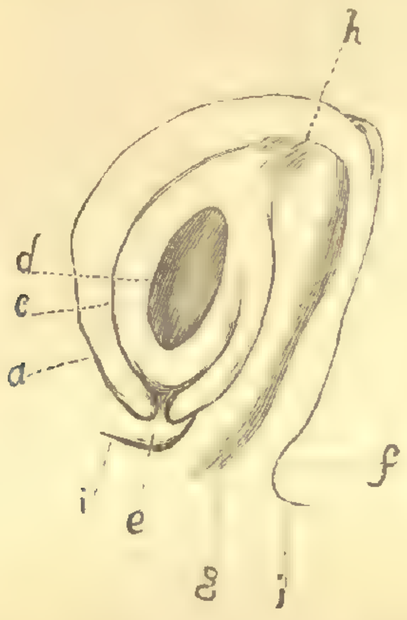


FIG. 804. ANATROPOUS OVULE OF ACTÆA SPICATA IN SECTION. Only one Coat exists on it.

verted, or anatropous, as in *Actæa*, so as to bring the micropyle close to the placenta, while the Ovule itself remains straight (see Fig. 804); other Ovules are curved

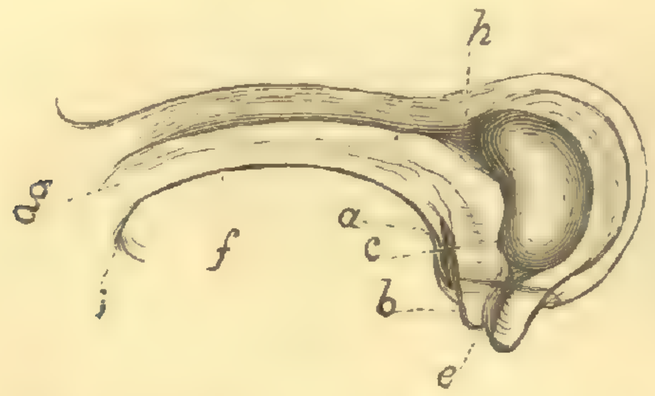


FIG. 805. YOUNG CAMPYLOTROPOUS OVULE OF LYCHNIS DIURNA IN OPTICAL SECTION. The Funiculus is very long, and the Inner Coat projects considerably at the Micropyle.

or campylotropous (see Figs. 805 and 806), as in the Pea and in *Lychnis*; so that in them also the micropyle is brought near the placenta, but the funiculus is only

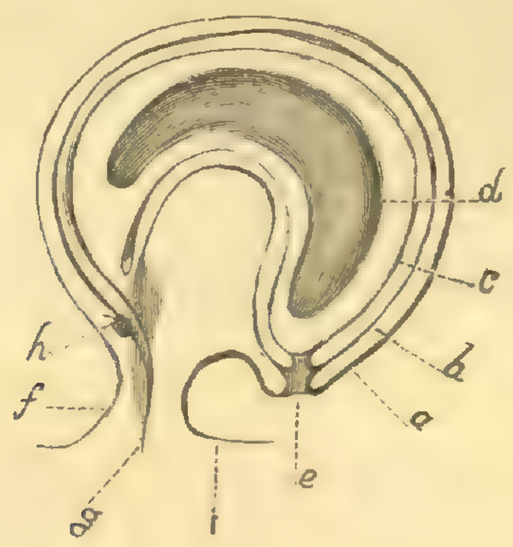


FIG. 806. CAMPYLOTROPOUS OVULE IN SECTION, showing Two Coats.

adherent slightly to one side of the Ovule. The form selected for description is called erect, or orthotropous (see Fig. 803). The Ovules of orchids have no fibro-vascular bundle in the funiculus.

Development. This shows peculiarities in certain plants. In the Ovules of *Santalum album*, and occasionally in those of some orchids, there are two embryonal vesicles, so that two embryos may form in a seed. In seeds of

Ovule—*continued.*

Oranges, of the Spindle-tree, of Funkias, and of certain other plants, it is usual to find two, or even three or four, embryos. But this results from budding from the tissues of the nucellus of several small cellular growths, which push the wall of the embryo-sac before them, and occupy the place of the true embryo: the latter is usually crushed by them, and perishes. This process has been called Polyembryony. It is a case of vegetative replacing true sexual reproduction, and, by its discovery two or three years ago, various apparent anomalies in hybridisation have been explained.

The processes of fertilisation, and of subsequent development, in the Conifers and other Gymnosperms, are so different in many respects from those above described, as to call for a brief notice. The Ovules are not inclosed in carpels, as in other flowering plants; but in general appearance and structure they do not show any marked peculiarities as contrasted with the Ovules of these plants. They are orthotropous in some (Yew), and anatropous in others (Pines, &c.). They have only one coat. The contents of the embryo-sac, and the development of the embryo, are markedly different from what we find in other Phanerogams. At an early stage, the sac is filled with protoplasm, in which lies a single nucleus; but this very soon divides repeatedly (as in other Phanerogams to form the endosperm), and the sac may thus become more or less full of new cells, the temporary endosperm, ranged along the wall, or occupying most of the cavity. Certain of these cells near the micropyle do not divide like the others, but remain larger than them. Each of these large cells after a time divides into a small cell above and a larger one below. The small cell may remain undivided, but usually divides into a rosette of four (*e.g.*, Juniper), or into more, arranged in two or three layers (*e.g.*, Pines), forming the neck, or rosette cells. In each case, an opening is left between them down to the larger central cell. The whole body formed by the group of cells is known as the corpusculum. The number of corpuscula varies from three to fifteen. The pollen grain lies directly upon the micropyle, with no apparent effect, in most cases, for a long time; but at last it pushes a tube down to the embryo-sac, which is pierced, allowing the end of the tube to lie directly on the rosette cells, and to push between them into the upper end of the large central cell. Some of the substance passes into the latter cell, part becoming diffused, and part remaining visible for a time as an upper nucleus; but this nucleus afterwards becomes united with the true nucleus of the cell, to form a new nucleus. Then follows a series of cell-divisions at the lower end of the central cell, which result, in general, in the formation of four rows of cells, side by side, lengthwise. The lowest cell of each row divides, to form an embryo. Thus, it is the rule for Gymnosperms to produce several embryos in a seed; but in most seeds only one embryo is fully developed, the others being destroyed by pressure of the one upon them. This one developed is nourished largely at the expense of the endosperm.

Much use is made in Systematic Botany of the differences in structure, form, and development of and in Ovules.

The meaning of the lettering in the sections of Ovules is as follows: *a*, outer coat; *b*, inner coat; *c*, nucellus; *d*, embryo sac; *e*, micropyle; *f*, stalk, or funiculus; *g*, fibro-vascular bundle of stalks; *h*, chalaza; *i*, placenta.

OXALIDEÆ. A tribe of *Geraniaceæ*.

OXALIS (from *oxys*, acid; referring to the taste of the leaves). TRIBE *Oxalideæ* of ORD. *Geraniaceæ*. A very large genus (upwards of 220 species) of greenhouse, hardy, or nearly hardy herbs, sometimes stemless, with a bulbous or fleshy rhizome, sometimes

Oxalis—*continued.*

caulescent, rarely suffruticose. Three or four species are found in the temperate regions, one or two are broadly dispersed between the tropics, and the rest are almost equally distributed through South Africa, tropical and sub-tropical America, and extra-tropical South America. Flowers yellow, pink, or white, sometimes dimorphous, regular, on axillary or radical, one or more flowered peduncles; sepals five, imbricate; petals five, contorted. Leaves radical or cauline, exstipulate, alternate; digitately or pinnately tri- to many-foliolate; leaflets entire or emarginately bilobed. Stipules scale-like, adnate to the petioles, or none. All the species are of very easy culture, and thrive best in sandy soil, and in a warm and dry situation. They are interesting and pretty as borders to other plants, or when forming large masses among the latter. They are also suited for points of rockwork, associated with ferns, or when forming masses in nooks or corners in woods, or on the turf. Used as edgings, from 6in. to 12in. apart is sufficiently close for the taller-growing species. The plants root fast, and spread rapidly. Several species are most effective pot-plants, and may either be kept under glass all the year round, or laid on their sides out of doors, when dormant, and thoroughly dried off. Propagated by seeds, by cuttings, and by divisions of the root. The species here described are greenhouse perennials, except where otherwise stated.

O. Acetosella (Acetosella).* Common Wood Sorrel. *fl.* white, beautifully veined with purple; petals oval, blunt; scapes longer than the leaves, one-flowered. Spring. *l.* obcordate, puberulous. Root of many scaly joints, creeping. *h.* 3in. Northern hemisphere (Britain). (Sy. En. B. 310.) Of this perennial species, there is a very interesting but somewhat rare variety, with deep rose-purple flowers.

O. arenaria (sand-loving).* *fl.* bright violet-purple, 1in. to 1¼in. across, disposed in umbels of three to ten. *l.* of three or four sessile, bilobo-obcordate leaflets, glaucous beneath. Rhizome of fleshy scales. *h.* 4in. Chili, 1875. Half-hardy perennial. (B. M. 6193.)

O. articulata (jointed).* *fl.* bright mauve-pink, 1in. in diameter, produced in umbels, on elongated scapes. *l.* trifoliolate, with broadly obcordate leaflets, of a bright green, with reddish margins. Rootstock stout, woody, 2in. to 3in. high. South Brazil, 1870. **A very distinct plant.** (B. M. 6748.)

O. Barrelieri (Barrelier's).* *fl.*, petals yellow, with two orange spots at the base of each lamina, obcordate-cuneate, united by their claws; peduncles solitary, axillary from the upper leaves. March and April. *l.* spreading; leaflets three, drooping, rhombeo-ovate, glabrous. Stem 8in. to 12in. high. Brazil. Greenhouse annual. (B. M. 3748.)

O. bipunctata (two-spotted-sepaled). *fl.* lilac, with deeper veins; petals truncate, unequally crenate; scape compressed, paniculately many-flowered, and (as well as the petioles) pilose. Spring. *l.*, leaflets three, sessile, broadly obcordate, pubescent beneath, smooth above. *h.* 6in. Brazil, 1826. (B. M. 2781.)

FIG. 807. OXALIS BOWIEI.

O. Bowiei (Bowie's).* *fl.* rose-red, yellowish at the base inside, large; peduncles about equal in length to the leaves, umbelliferous. August. *l.*, leaflets three, obtuse, almost sessile, light green above, slightly pubescent underneath, ciliated. *h.* 6in. to 10in. Cape of Good Hope, 1824. An elegant species. See Fig. 807. (B. i. 25; B. R. 1585.)

O. caprina. Goat's Foot. *fl.* bluish flesh-colour, with a yellow bottom, erect; scape umbelliferous, two or three-flowered. March to June. *l.*, leaflets three, obcordately two-lobed, smooth, somewhat ciliated. Bulb ovate, triangular. *h.* 3in. Cape of Good Hope, 1757.

O. carnosa (fleshy). *fl.* yellow, with obtuse, emarginate, sometimes denticulated petals; scape two, three, or many-flowered. Autumn. *l.*, leaflets nearly sessile, obcordate, fleshy, marked beneath with crystalline dots. Stem short, scaly. Root fusiform. *h.* 3in. to 6in. Chili, 1825. (B. M. 2866; B. R. 1063.)

O. cernua (drooping). *fl.* yellow, at first drooping; scape umbelliferous, many-flowered. Spring. *l.*, leaflets three, obcordately two-lobed, smooth, or a little ciliated. *h.* 6in. Cape of Good Hope, 1757. There is a variety, *flore-pleno*, having double flowers.

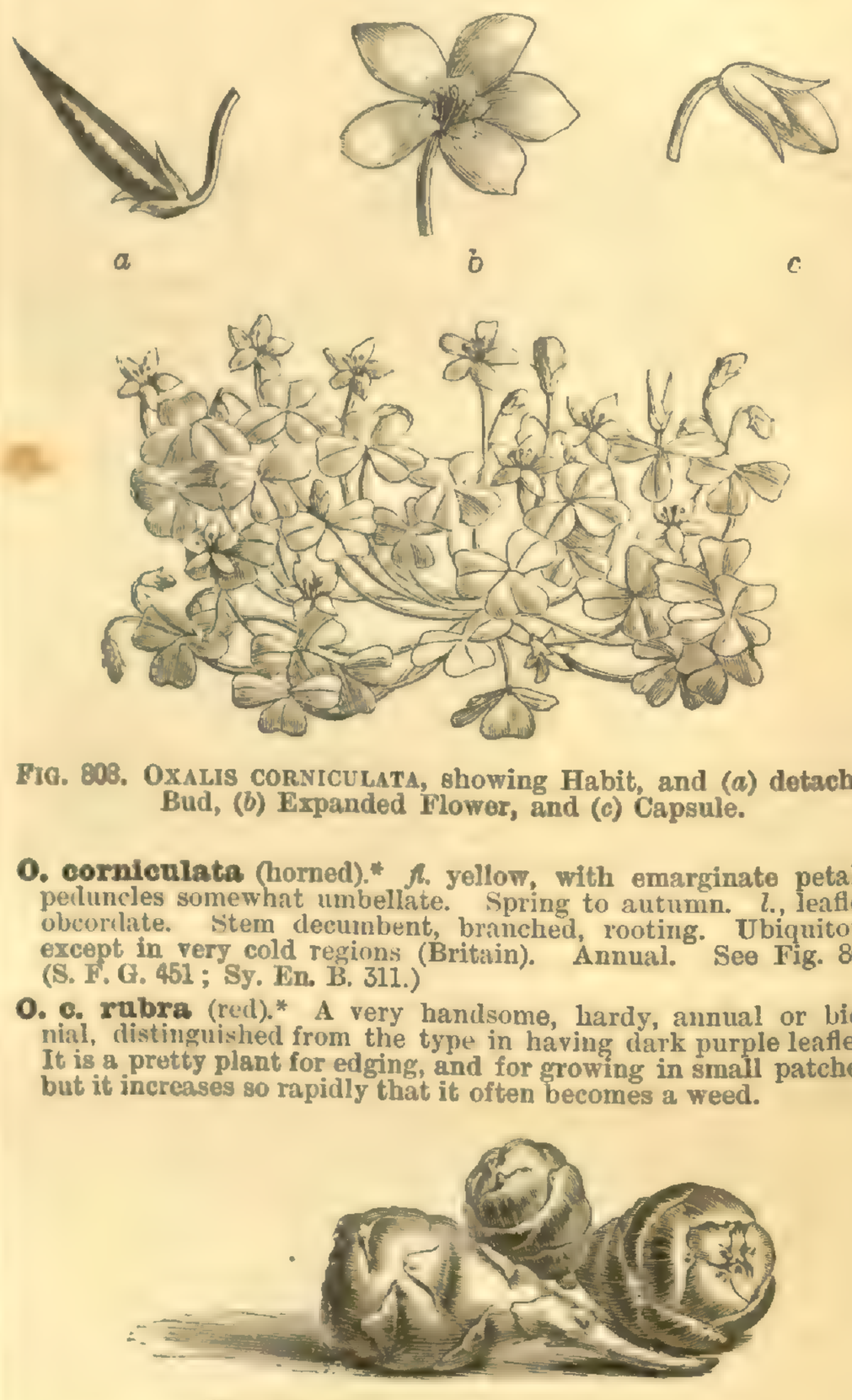


FIG. 808. OXALIS CORNICULATA, showing Habit, and (*a*) detached Bud, (*b*) Expanded Flower, and (*c*) Capsule.

O. corniculata (horned).* *fl.* yellow, with emarginate petals; peduncles somewhat umbellate. Spring to autumn. *l.*, leaflets obcordate. Stem decumbent, branched, rooting. Ubiquitous, except in very cold regions (Britain). Annual. See Fig. 808. (S. F. G. 451; Sy. En. B. 311.)

O. c. rubra (red).* A very handsome, hardy, annual or biennial, distinguished from the type in having dark purple leaflets. It is a pretty plant for edging, and for growing in small patches; but it increases so rapidly that it often becomes a weed.

FIG. 809. BULBS OF OXALIS CRENATA.

O. crenata (scolloped-petaled). *fl.* yellow, striped with purple; petals crenated; peduncles umbelliferous, five or six-flowered, longer than the leaves. September. *l.*, leaflets obovate. Stem erect, leafy. *h.* 2ft. Lima, 1829. Greenhouse annual. See Fig. 809. (S. B. F. G. ser. ii. 125.)

O. Deppei (Deppe's). A synonym of *O. tetraphylla*.

O. elegans (elegant).* *fl.* purple, large; sepals acuminated, with two spots at the top of each; scapes very long, two to six-flowered. July. *l.*, leaflets three, broad, roundish-obovate, emarginate, violet on the under surface, and, as well as the petioles, smooth. *h.* 6in. Peru. Plant stemless. (B. M. 4490.)

O. enneaphylla (nine-leaved).* *fl.* white or pale rose-coloured, with purple veins; peduncles the length of the leaves. June. *l.*, leaflets from nine to twenty, usually in two series, smooth, glaucous, obcordate, wedge-shaped, almost bifid. Stipe creeping at base, scaly. *h.* 4in. Fuegia, 1875. Hardy perennial. (B. M. 6256.)

O. floribunda (bundle-flowered). A synonym of *O. rosea*.

Oxalis—*continued.*

O. grandiflora (large-flowered). A synonym of *O. variabilis albiflora.*

O. hirta (hairy).* *fl.* varying from pale violet to deep red; peduncles one-flowered, axillary. *l.* sub-sessile, with narrow-lanceolate or linear leaflets, glabrous above and hairy beneath. *h.* 3in. Cape of Good Hope.

O. h. fulgida (shining). *fl.* of a beautiful purple colour. September to November. Cape of Good Hope, 1820. (B. R. 1073.)

O. h. rosacea (rose-coloured). *fl.* deep red, pale outside, with yellowish claws. Cape of Good Hope, 1793. (B. R. 1031, under name of *O. rubella*).

O. incarnata (flesh-coloured). *fl.* pale flesh-coloured, with very long styles; peduncles the length of the leaves, one-flowered. Spring. *l.* stalked, several at remote distances, in whorls. Stem weak, erect, purple, branched, smooth, leafy. Roots of two or three fusiform legs. *h.* 6in. Cape of Good Hope, 1739.

O. lasiandra (woolly-stamened).* *fl.* crimson, finely pubescent on the outside, large, borne in umbels of about twenty. Summer. *l.* digitate; leaflets 3in. long, 1in. broad, oval-spathulate, wavy at the edges, dark green, paler underneath, and spotted with crimson. *h.* 9in. to 18in. Mexico, 1840. (B. M. 3896.)

O. lasiopetala (hairy-petaled). *fl.*, petals deep rose-colour, oblique; peduncle elongated, terminated by a many-flowered cyme. *l.* radical, numerous, on long, terete petioles; leaflets large, obcordate, with a deep notch. Root tuberous and nodose. Buenos Ayres and Monte Video. (B. M. 3932.)

O. latifolia (broad-leaved). *fl.* violet, a little smaller than those of *O. carnosa*; scapes six or seven-flowered. *l.*, leaflets three, somewhat deltoid, emarginately two-lobed, ciliated. *h.* 6in. Mexico.

O. lobata (lobed).* *fl.* yellow, spotted with red; sepals acute; scapes longer than the leaves. October and November. *l.*, leaflets obcordate, rather glaucous beneath. *h.* 3in. Chili, 1823. Plant smooth, stemless. Hardy. (B. M. 2386.)

O. lupinifolia (Lupine-leaved). *fl.* yellow; scape one-flowered, length of petiole. Autumn. *l.*, leaflets seven or eight, lanceolate, acutish, smooth, spotted at the base. *h.* 3in. Cape of Good Hope, 1775.

O. luteola (yellowish). *fl.* yellow; scapes one-flowered, length of leaves, with two bracts a little above the middle. January to September. *l.*, leaflets obcordate, somewhat retuse. Roots bulbous. *h.* 3in. Cape of Good Hope, 1823. Plant hairy.

O. Martiana (Martius').* *fl.* deep purple-rose colour, disposed in ample cymes on radical scapes; petals cuneate, oblique, a little hairy at back. *l.* radical, on long, flexuous petioles; leaflets large, obcordate, approaching triangular, with a rather deep but sharp sinus. Argentine Republic. (B. M. 3938.)

O. monophylla (one-leaved). *fl.* pale purplish, with a yellowish tube, the filaments bearing glandular hairs; scapes one-flowered. Autumn. *l.* simple, ovate, retuse. *h.* 2in. Cape of Good Hope, 1795. SYN. *O. rostrata.*

O. Neæi glabrata (Nee's glabrous). *fl.* whitish, minute, inconspicuous, disposed in axillary cymes. *l.* trifoliolate; leaflets ovate. Mexico, 1872. (Ref. B. 292.)

O. Ortgiesii (Ortgies'). *fl.* yellow, small, in dichotomous, axillary cymes. *l.* trifoliolate, on long, red stalks; leaflets ovate, triangular, dark olive-green above, purple beneath, with a broad, angular notch cut from the apex. Stems purplish, erect. Roots fibrous. *h.* 1ft. Andes of Peru, 1875. (R. G. 817.)

O. pentaphylla (five-leaved). *fl.* lilac or rosy-flesh-coloured, with yellowish base; peduncles one-flowered, longer than the leaves. Spring to autumn. *l.*, leaflets five, linear, rather entire at the apex. Stem somewhat erect, naked below. *h.* 6in. Cape of Good Hope, 1800. (B. M. 1549.)

O. purpurea (purple). *fl.* purple; scapes one-flowered, longer than the leaves, with two bracts under the middle. Autumn. *l.*, leaflets roundish, wedge-shaped. Roots bulbous. *h.* 3in. Cape of Good Hope, 1812.

O. rosea (rose-coloured).* *fl.* rose, the petals crenated at the apex; peduncles bifid, corymbosely-racemose at the apex, four times longer than the leaves. Spring. *l.*, leaflets three, obcordate. Stem erect, fleshy, leafy. *h.* 6in. to 12in. Chili, 1823. (B. M. 2415 and 2830; B. R. 1123, under name of *O. floribunda.*)

O. rostrata (beaked). A synonym of *O. monophylla.*

O. rubella (ruddy). A synonym of *O. hirta rosacea.*

O. stricta (upright).* *fl.* yellow; peduncles axillary, two to six-flowered, longer than the leaves. April to December. *l.* trifoliolate; leaflets obcordate. Stems branching, leafy. *h.* 1½ft. North America, 1658 (naturalised in Britain). Hardy. (Sy. En. B. 312.)

O. tetraphylla (four-leaved).* *fl.* lurid red or purplish-violet, large; umbels many-flowered; scape and petioles loosely pilose. June. *l.*, leaflets large, obcordate, pilose, glaucous beneath, on short petioles. Bulbs large, scaly. Mexico, 1827. A very hand-

Oxalis—*continued.*

FIG. 810. OXALIS TETRAPHYLLA, showing Habit and detached Flower.

some, hardy perennial, thriving in almost any situation. See Figs. 810 and 811. (L. B. C. 1500; S. B. F. G. ser. ii. 96, under name of *O. Deppei.*)

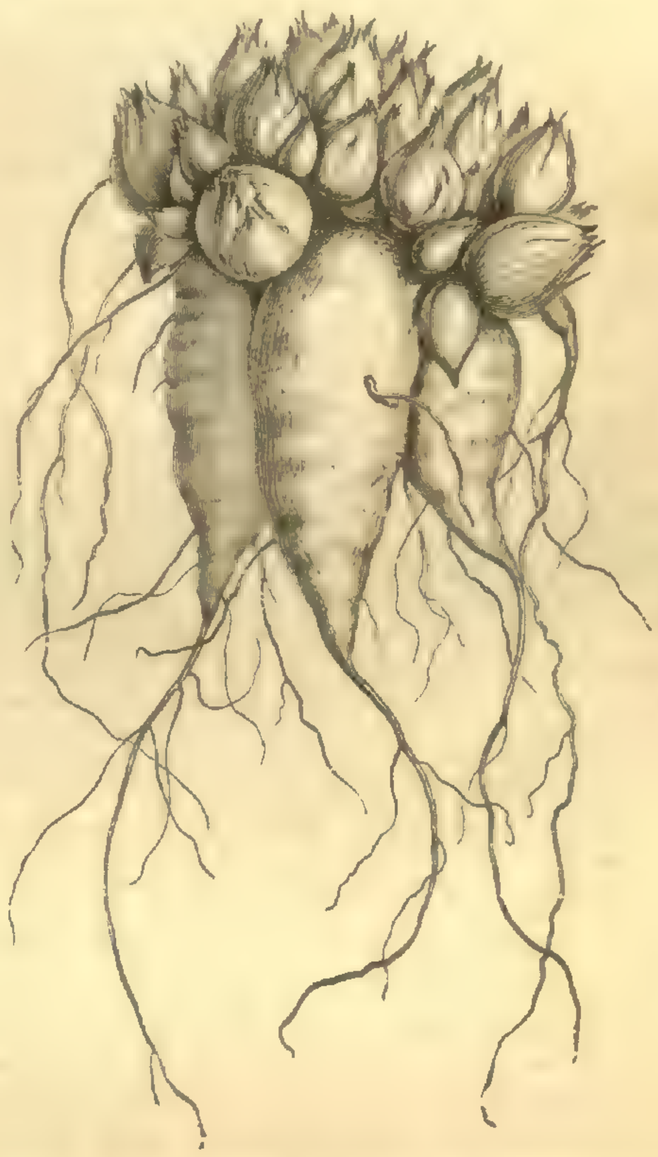


FIG. 811. BULBS OF OXALIS TETRAPHYLLA.

O. tortuosa (twisted). *fl.* umbellate; petals yellow, usually bordered with red. June. *l.*, leaflets linear, obtuse, pilose beneath. Stem fleshy, scaly. *h.* 6in. Chili, 1826. (B. R. 1249.)

O. tuberosa (tuberous). *fl.*, peduncles umbelliferous. *l.*, leaflets ovate. Stem branched. Root tuberculate. *h.* 5ft. Bolivia, 1853. The tuberous roots, when cooked, are used, by the Chilians, as an article of food. (R. G. 1126.)

O. valdiviensis (Valdivian).* *fl.* deep yellow, with a reddish streak, particularly on the outside, disposed in small clusters on the ends of the very long peduncles. Summer. *l.*, leaflets cordate, with very rounded lobes. *h.* 6in. to 8in. Chili, 1862. A charming, hardy annual. (R. G. 626.)

O. variabilis (variable).* *fl.* white or red; pedicels equal to or longer than the leaves. October to December. *l.*, leaflets roundish, the middle one cuneated at the base. *h.* 3in. Cape of Good Hope, 1795. Plant stemless. (B. R. 1505.)

O. v. albiflora (white-flowered). *fl.*, limb of corolla white, large; scapes as long as the petioles. July. (B. M. 1683, under name of *O. grandiflora.*)

O. v. rubra (red). *fl.*, corolla red; scapes longer than the petioles. September to November. (B. M. 1712.)

O. v. speciosa (showy). *fl.* rose-purple; styles very long; scapes one-flowered, about equal in length to the petioles. Autumn. *l.* stalked, with three roundish leaflets. *h.* 3in. 1690.

O. versicolor (various-coloured).* *fl.* white inside and reddish outside; styles very long, and as well as the filaments beset,

Oxalis—*continued.*

with glandular hairs. Early spring. *l.*, leaflets three, linear, emarginate, with two red glands beneath. Stem declinate, naked at the base. *h.* 3in. Cape of Good Hope, 1774. (B. M. 155.)

O. violacea (violet-coloured). *fl.* pink, erectish, with a short involucre; scape umbelliferous, three to nine-flowered. Spring to autumn. *l.*, leaflets three, obcordate, smooth, reddish underneath. Bulbs fusiform, black. *h.* 3in. North America, 1772. Hardy perennial. (B. M. 2215.)

OXEYE. *See* **Buphthalmum.**

OXEYE DAISY. *See* **Chrysanthemum Leucanthemum.**

OXLIP. *See* **Primula elatior.**

OXYANTHUS (from *oxys*, sharp, and *anthos*, a flower; referring to the sharply-toothed calyx and corolla). SYN. *Megacarpha*. ORD. *Rubiaceæ*. A genus comprising about a dozen species of highly ornamental stove trees and shrubs, with terete branches, inhabiting tropical, sub-tropical, and South-eastern Africa. Flowers white or yellow, scented, elongated, disposed in short or long, many-flowered, axillary corymbs; calyx five-toothed; corolla hypocrateri-formed, five-lobed; pedicels bracteolate. Leaves opposite, shortly petiolate, often oblique at base, coriaceous; stipules rather large, intra-petiolar, oblong, obtuse or acute, deciduous. The two species described below thrive in a peaty soil, and should be grown in well-drained pots, in a light, airy position. Practically, the conditions which are found to suit their near allies, the Gardenias, will also suit these. Propagated by cuttings, inserted under a bell glass, in bottom heat.

O. speciosus (showy). A synonym of *O. tubiflorus*.

O. tubiflorus (tube-flowered).* *fl.* white, 6in. long, with the limb 2in. across, in terminal heads. July. *l.* broad, 5in. long. Branchlets, leaves, and calyces glabrous. *h.* 3ft. to 4ft. Sierra Leone, 1789. Shrub. SYNS. *O. speciosus* (B. M. 1992), *Gardenia tubiflora* (A. B. R. 183). (B. M. 4636.)

O. versicolor (various-coloured). *fl.* whitish, rose-colour, and pink; corolla tube 4in. to 6in. long; segments linear, scarcely longer than the stamens. July. *l.* oval-lanceolate, acuminate, glabrous. *h.* 3ft. 1839. (F. d. S. ii. 148.) Stated to come from Cuba in work just quoted; it, however, must be a native of tropical Africa.

OXYBAPHUS (from *oxybaphon*, a vinegar saucer, or small shallow vessel; in allusion to the shape of the involucre). Umbrella Wort. SYNS. *Calymenia*, *Calyxhymenia*, *Vitmania*. ORD. *Nyctagineæ*. A genus comprising about a score species of greenhouse or hardy, annual or perennial, erect or prostrate herbs, mostly natives of Western America, a few being indigenous to the Eastern States of North America, and one Himalayan. Flowers white, pink, or scarlet; involucre one to five-flowered; perianth campanulate or funnel-shaped. Fruit small. Leaves opposite, sessile or petiolate. The species are of no great value for horticultural purposes. Those described below thrive in a sandy-loam soil. Propagated by seeds, sown in the open border in May, or on a mild hotbed in March; or by divisions in spring.

O. Cervantesii (Cervantes'). *fl.* bright pink, panicled; peduncles and involucres villously viscous. Summer and autumn. *l.* opposite, long-stalked, cordate, obtuse, entire, slightly pubescent; margins ciliated with short hairs. *h.* 1½ft. Mexico, 1823. Half-hardy perennial. (S. B. F. G. 84.)

O. viscosus (clammy). *fl.* pink, racemose. June to October. *l.* cordate-orbiculate, acute, tomentose. *h.* 2ft. Peru, 1793. Hardy annual. When the seeds are ripe, the calyx turns brown, expands, and is suspended over them like a little umbrella. (B. M. 434.)

OXYCARPUS. A synonym of **Garcinia** (which *see*).

OXYCEROS. A synonym of **Randia** (which *see*).

OXYCLADIUM. Included under **Mirbelia** (which *see*).

OXYCOCCUS (from *oxys*, sharp, and *kokkos*, a berry; referring to the sharp, acid taste of the berries). Cranberry. SYN. *Schollera*. ORD. *Vacciniaceæ*. A genus

Oxycoccus—*continued.*

comprising only a couple of species of small, hardy decumbent or sub-erect, very glabrous shrubs, natives of Europe, North Asia, and North America. Flowers axillary or terminal, solitary or few, nodding or drooping; corolla pink, with four or five linear, revolute segments. Berry globose, fleshy, many-seeded. Leaves small, alternate, persistent, entire. Branches filiform. Both these plants naturally affect swampy spots, and the first-named is planted nearly always with a view to the periodic flooding of the beds; it will, however, thrive in a peaty border where no great amount of moisture is present, but under such conditions will not, of course, develop so quickly. *O. palustris* is a neat little plant, worth growing in pots or pans standing in water. The species may be propagated by means of the long, creeping shoots, which frequently root; or by cuttings, inserted under a hand glass, and shaded until established.

O. macrocarpus (large-fruited).* American Cranberry. *fl.* pink, on erect, proliferous branches. Spring. *l.* elliptic-oblong, nearly flat and obtuse, glaucous beneath. Stems prostrate, filiform, creeping. North America, 1760. This species is largely cultivated in North America for the sake of its fruits, which are bottled or put into barrels, &c., as well as used fresh for tarts, &c. (B. M. 2586, under name of *Vaccinium macrocarpum*.)

O. palustris (marsh-loving).* Common Cranberry. *fl.* pink, with reflexed, oblong segments; pedicels terminal, one-flowered. May. *fr.* dark red, with a strong acid taste. *l.* small, ovate, entire, acute, smooth, with revolute margins. Stems filiform, creeping. Northern hemisphere (Britain). (Sy. En. B. 876, under name of *Vaccinium Oxycoccus*.)

OXYDENDRON (from *oxys*, sour, and *dendron*, a tree; in allusion to the foliage being sour to the taste). ORD. *Ericaceæ*. A monotypic genus. The species is a beautiful, hardy tree; it thrives in a moist, peaty soil, and is propagated from imported seeds.

O. arboreum (tree-like).* Sorrel-tree. *fl.* white, in terminal panicles of many racemes; corolla ovate, five-toothed; filaments hairy; style thick, five-angled. June and July. *l.* oblong-lanceolate, acuminated, serrulate, glabrous. Branches tapering. *h.* 15ft. to 40ft. Eastern United States, 1752. SYN. *Andromeda arborea* (under which name it is figured in B. M. 905).

OXYGONIUM. Included under *Asplenium*.

OXYLOBIUM (from *oxys*, sharp, and *lobos*, a pod; legumes or seed-pods ending in a sharp point). Including *Callistachys* and *Podolobium*. ORD. *Leguminosæ*. A genus comprising about twenty-seven species of greenhouse ornamental shrubs, or rarely under-shrubs, confined to Australia. Flowers yellow, or partly or totally purple-red, disposed in terminal or axillary racemes; petals clawed; standard orbicular or reniform; wings oblong. Leaves opposite, whorled, or scattered, simple, entire, or rarely with pungent lobes. The species thrive in a compost of peat and loam, with plenty of sand added. Propagated, during April or May, by cuttings of rather firm young shoots, inserted in sand, under a bell glass. Perfect drainage is most essential. The species here described are those usually seen in greenhouses.

O. acutum (acute). *fl.* red, yellow, all axillary, in loose clusters, shorter than the leaves. March. *l.* in whorls of three, or scattered, ovate-elliptic or almost oblong, ⅛in. to ⅜in. long, tapering into a pungent point. *h.* 2ft. 1842. (B. M. 4040, under name of *Gastrolobium acutum*.)

O. Callistachys (Callistachys).* *fl.* yellow, in dense, terminal racemes. June to August. *l.* lanceolate-acuminate, mostly in irregular whorls of three. *h.* 3ft. to 4ft. 1815. SYNS. *Callistachys lanceolata* (B. R. 216), *C. longifolia* (P. M. B. viii. 31), *C. ovata* (B. M. 1925), *C. retusa* (L. B. C. 1983).

O. capitatum (headed). *fl.* yellow, in axillary clusters, or sometimes forming a terminal, compact, corymbose raceme or head. June. *l.*, lowest sometimes obovate, all the others oblong-lanceolate or linear, 1in. to 2in. long, obtuse, with a short, usually recurved point. *h.* 2ft. 1837. (B. R. 1843, 16.)

O. cordifolium (cordate-leaved). *fl.* orange-red, usually three or four together, in small, terminal heads or umbels. April. *l.* irregularly whorled in threes, ovate-cordate, from ⅛in. to ¼in. long. *h.* 1ft. to 2ft. 1807. (A. B. R. 492; B. M. 1544; L. B. C. 937.)

O. cuneatum obovatum (obovate, wedge-shaped).* *fl.* yellow, or the lower petals purple, in dense, corymbose racemes or

Oxylobium—*continued.*

clusters, either all axillary or also terminal. March. *l.* very broadly cuneate, truncate, mostly about 1½in. long. *h.* 2ft. 1840. (B. R. 1843, 36, and P. M. B. x. 243, under name of *O. obovatum.*)

O. ellipticum (elliptic-leaved).* *fl.* yellow, in crowded, corymbose racemes. May to September. *l.* from oval-oblong to oblong-linear or lanceolate, mucronate, arranged in irregular whorls of three. *h.* 2ft. to 3ft. 1805. (B. M. 3249). SYN. *O. Pultenæa* (L. B. C. 1947).

O. e. angustifolium (narrow-leaved). *l.* long, and narrow. 1805. A handsome variety when well grown. (B. M. 2442, B. R. 392, and L. B. C. 163, under name of *O. arborescens.*)

O. lineare (linear-leaved). *fl.* yellow, or of a dull red, in rather loose, terminal racemes, or sometimes in the upper axils. October. *l.* mostly alternate, linear or linear-lanceolate, 2in. to 6in. long, obtuse or mucronate, silky beneath when young. *h.* 2ft. 1838. (B. M. 3882, under name of *Callistachys linearis.*)

O. obovatum (obovate-leaved). A synonym of *O. cuneatum obovatum.*

O. obtusifolium (blunt-leaved).* *fl.* with keel and wings crimson, and the standard deep orange-coloured, and yellow at the base, disposed in terminal, often one-sided, racemes of 1in. to 2in., on very short pedicels. April. *l.* alternate or irregularly whorled in threes, linear, obtuse, smooth above, but clothed with silky tomentum beneath, with revolute edges. *h.* 1ft. to 3ft. 1825. A handsome, compact-growing plant. (S. F. A. 5.)

O. ovalifolium (oval-leaved). A synonym of *O. retusum.*

O. Pultenæa (Pulteney's), of Loddiges. A synonym of *O. ellipticum.*

O. retusum (retuse). *fl.* reddish-yellow, in dense, almost sessile, terminal clusters or corymbose racemes, or rarely also in the upper axils. May. *l.* mostly opposite, petiolate, ovate or oblong-elliptic, obtuse, truncate or emarginate, 1in. to 2in. long. *h.* 2ft. 1823. SYN. *O. ovalifolium.* (B. R. 913.)

O. scandens (climbing). *fl.* yellow, few, in loose, terminal or axillary racemes. April. *l.* mostly opposite, from obovate or ovate-elliptical to ovate-lanceolate or narrow-oblong, 1½in. to 2in. long. Branches procumbent or half climbing. *h.* 2ft. 1825. (B. R. 1434, under name of *Mirbelia Baxteri.*)

O. staurophyllum (cross-leaved). *fl.* yellow, in loose, axillary racemes, rarely exceeding the leaves. April. *l.* alternate or opposite, ⅜in. to 1½in. long, with pungent points and a cuneate base, and deeply divided into three lanceolate, pungent lobes; the lateral ones divaricate, and sometimes again bilobed. *h.* 2ft. 1822. (B. R. 959, L. B. C. 1177, and P. M. B. iv. 171, under name of *Podolobium staurophyllum.*)

O. trilobatum (three-lobed).* *fl.* yellow, in loose, axillary or terminal racemes, often exceeding the leaves. April. *l.* mostly opposite, from broadly ovate to lanceolate, 1in. to 2in. long, with pungent points, and bordered by a few distant, pungent teeth or lobes, of which one or two on each side near the base are usually larger than the others. *h.* 2ft. 1791. (A. B. R. 320, under name of *Pultenæa ilicifolia*; B. M. 1477 and B. R. 1333, under name of *Podolobium trilobatum.*)

O. virgatum (twiggy). *fl.* orange, scarlet, in terminal, sessile, corymbose racemes or clusters, and occasionally in the upper axils. May. *l.* in threes or opposite, narrow-oblong, or almost linear, rarely ovate-oblong, very obtuse and emarginate, ⅜in. to 1½in. long. 1830. (B. M. 3328, and B. R. 1647, under name of *Gastrolobium retusum.*)

OXYPETALUM (from *oxys*, sharp, and *petalum*, a petal; petals sharp-pointed). SYNS. *Gothofreda*, *Schizostemma*, and *Tweedia*. ORD. *Asclepiadeæ*. A genus comprising about fifty species of erect or twining, stove or greenhouse, perennial herbs or sub-shrubs, natives of South America, mostly Brazil, one species being found in Mexico and the West Indies. Flowers blue, white, yellowish-white, or purplish; calyx five-parted; corolla tube short, campanulate or almost globular, and with five often narrow lobes; cymes sometimes umbelliform, loosely few-flowered, sometimes capitate, rarely corymbosely branched, terminal or (in one species) axillary, pedunculate. Leaves opposite. The species mentioned below (probably the only ones introduced) like a rich, well-drained, loamy soil, and do best if planted out inside the stove or greenhouse, and their shoots trained near the glass. *O. cæruleum* is a charming climber, remarkable for the changes in colour exhibited by the flower at various stages of its existence. When first open, it is pale blue, with a slight tinge of green; then purplish, and, when withered, lilac. All are propagated by cuttings of the young growths, inserted under a bell glass, in bottom heat.

Oxypetalum—*continued.*

O. appendiculatum (appendiculate). *fl.* pale yellow, fragrant; petals narrow-lanceolate, acute, erectly spreading; peduncles cymose, usually four-flowered. *l.* ovate, acuminated, cordate, downy. Brazil, 1823. Stove twiner.

O. Banksii (Banks'). *fl.* purple; corolla segments linear or linear-lanceolate; peduncles lax-flowered, longer than the pedicels. June. *l.* cordate or ovate-cordate, shortly acuminate, incano-puberulous beneath. Brazil, 1826. Stove twining sub-shrub.

O. cæruleum (blue).* *fl.* blue; segments of corolla oblong, spreading; peduncles shorter than the leaves, few-flowered, erect. July. *l.* cordate-oblong or cordate-lanceolate, mucronate, tomentose on both sides. Buenos Ayres, 1832. Greenhouse or stove twining sub-shrub. (B. 55; B. M. 3630, under name of *Tweedia versicolor*; S. B. F. G. ser. ii. 407, under name of *T. cærulea.*)

O. solanoides (Solanum-like). *fl.* bluish, tinged with rose-colour; corolla segments spreading; peduncles terminal or extra-axillary, corymbosely paniculate, many-flowered. June. *l.* lanceolate or oblong-cordate, mucronate, acute, petiolate, tomentose. Stem almost unbranched, erect. *h.* 6ft. Brazil, 1846. Stove sub-shrub. (B. M. 4367.)

OXYSPORA (from *oxys*, sharp, and *spora*, a seed; in allusion to the seeds being awned at both ends). ORD. *Melastomaceæ*. A small genus (four species) of very handsome, slender, erect, or almost scandent, stove shrubs, natives of Eastern Bengal and the Malayan Archipelago. Flowers pink or red, disposed in terminal, elongated, many-flowered, loose, nodding panicles; calyx lobes and petals four. Leaves long-stalked, large, oblong or lanceolate-ovate, long-acuminate, entire or sinuate-toothed, five to seven-nerved. *O. paniculata*, the only species introduced, thrives in a compost of sandy loam and fibry peat, with the addition of some small pieces of charcoal. Propagation may be effected by cuttings of young shoots, inserted in sandy soil, under a glass, in bottom heat, in April.

O. paniculata (panicled). *fl.* disposed in lax, drooping panicles, often 1ft. long; petals four, bright rose-colour, obovate, acute. Autumn. *l.* ovate or cordate-ovate, acuminate, five to seven-nerved, glabrous above, and obsoletely downy, with short hairs, or quite glabrous below, where also the nerves are very prominent, and red. *h.* 3ft. to 5ft. India, 1826. (B. M. 4563, under name of *O. vagans.*)

O. vagans (wandering). A synonym of *O. paniculata.*

OXYSTELMA (from *oxys*, sharp, and *stelma*, a girdle; in reference to the segments of the corona being acute). ORD. *Asclepiadeæ*. A small genus (four species) of stove, climbing, glabrous herbs or sub-shrubs, natives of tropical Asia and Africa. Flowers rather large; corolla purple-spotted and veined, rather broad; cymes loosely racemose or umbelliform, not unfrequently reduced to one flower. Leaves opposite, narrow. *O. esculentum* is the only species in cultivation; it thrives in a compost of loam, leaf mould, and sand. Good drainage is essential. Like many other stove climbers, it perhaps does best when planted out against a wall or rafter, and its shoots trained near the glass.

O. esculentum (esculent). *fl.* white, with a tinge of rose, large; corolla fringed with hairs; racemes longer than the leaves. *l.* linear-lanceolate, veiny, smooth, 4in. to 6in. long. India, Java, &c., 1816.

OXYTROPIS (from *oxys*, sharp, and *tropis*, a keel; the keel ends in a sharp point). ORD. *Leguminosæ*. An extensive genus (nearly 100 species) of hardy, much-branched herbs, sub-shrubs, or small shrubs, allied to *Astragalus*. They are found in the mountainous or cold regions of Asia, North America, and Europe. Flowers violet, purple, white, or pale yellowish, in axillary spikes or racemes, or springing from the stem; standard erect, ovate or oblong; petals unguiculate. Pods sessile or stipitate. Leaves impari-pinnate; leaflets entire, exstipellate. Several species are very handsome, but many which were at one time much grown are now lost to cultivation. They are of easy culture in any ordinary soil, but prefer a dry sandy loam. Propagated by seeds, sown in their permanent quarters; and by dividing the plant in spring. All the species mentioned below are pretty, dwarf-growing perennials.

Oxytropis—*continued.*

O. campestris (field). *fl.* cream-coloured, the keels and wings tinged with purple, erect; spikes ovate-oblong, dense-flowered; scapes hairy, about equal in length to the leaves. July. *l.*, leaflets many pairs, lanceolate, acute, hoary, and rather hairy. *h.* 3in. to 6in. Europe (Scotland). A pretty little alpine plant. (Sy. En. B. 374.)

O. fœtida (fœtid). *fl.* cream-coloured; spikes capitate, few-flowered; scapes rather longer than the leaves, woolly at the apex. June to August. *l.* with many pairs of lanceolate-linear, clammy, glabrous leaflets. South France, &c., 1819.

O. frigida racemosa (frigid, racemed). *fl.* ½in. long, in a short, spike-like raceme; peduncles longer than the leaves, hairy. *l.* erect, pinnate, 3in. to 4in. long, having narrow-lanceolate leaflets of a glaucous hue, and covered with adpressed hairs. Turkestan, 1884. Plant stemless. (R. G. 1154, f. 2, f-k.)

O. grandiflora (large-flowered). *fl.* of an intense rose-colour, large, loosely spicate; standard emarginate; scape twice as long as the leaves. June. *l.* oblong-lanceolate, adpressedly silky. *h.* 6in. Siberia, 1820.

O. Halleri (Haller's). *fl.* of a rich bluish-purple colour, rarely white, in round, dense heads; scapes solitary or twin, longer than the leaves. July. *l.*, leaflets ovate, acute. Plant stemless, clothed with silky hairs in every part. *h.* 6in. Europe (Scotland). An elegant little species for rockwork. (Sy. En. B. 373.)

O. Lambertii (Lambert's).* *fl.* rosy-carmine, large, spicate or capitate; scape rather longer than the leaves. August. *l.*, leaflets lanceolate, acute, rather remote. *h.* 6in. to 12in. North America, 1811. Plant stemless, silky and pilose in every part. A rare and beautiful rock-plant. (B. M. 2147; B. R. 1054.)

O. montana (mountain).* *fl.* bluish, with a purplish calyx; racemes short; scape a little longer than the leaves. July. *l.*, leaflets elliptic-lanceolate. Plant almost stemless, villous, the hairs on the petioles and scape spreading. *h.* 6in. Europe, 1581.

O. ochroleuca (yellowish-white). *fl.* yellowish-white, small, drooping, in short racemes; peduncles long, and, together with the calyx and ovary, covered with blackish hairs. *l.* pinnate,

Oxytropis—*continued.*

3in. to 4in. long, with oblong-lanceolate leaflets. Stem short, ascending, glaucescent. Turkestan, 1884. (R. G. 1154, f. 1, a-e).

O. pilosa (long-haired). *fl.* pale yellow, disposed in ovate-oblong spikes; peduncles axillary, longer than the leaves. July. *l.*, leaflets lanceolate, acute. Stem erect, softly pilose. *h.* 6in. Siberia, 1732. (B. M. 2483; J. F. A. 51, under name of *Astragalus pilosus.*)

O. pyrenaica (Pyrenean).* *fl.* sky-blue, erect, crowded, on a short raceme, which ultimately becomes elongated-oval; scapes set with stellate hairs. Summer. *l.*, leaflets lanceolate or oblong, pointed, somewhat concave, covered with long, silky hairs. *h.* 4in. to 6in. Central Pyrenees.

OXYURA. Included under **Layia** (which *see*).

OYSTER PLANT. *See* **Mertensia maritima.**

OYSTER SCALE. *See* **Scale Insects.**

OZOTHAMNUS (from *ozein*, to smell, and *thamnos*, a shrub; alluding to the odour of the plant). ORD. *Compositæ.* A genus comprising a considerable number of species of greenhouse or nearly hardy, mostly Australian shrubs, rarely sub-shrubs or herbs, now included, by Bentham and Hooker, under *Helichrysum.* Flower-heads small; involucre oblong, ovoid, or campanulate; inner bracts usually with small, coloured, radiating tips. The species described below thrives in almost any soil, and is readily propagated, in summer, by means of cuttings made of the half-ripened young wood.

O. rosmarinifolius (Rosemary-leaved).* *fl.-heads* white, in dense corymbs, usually terminating in numerous, small, leafy branches, forming a large, leafy panicle. July. *l.* linear, mostly obtuse, varying from under ½in. to above 1in. long, the margins recurved or revolute. *h.* (in Australia) 8ft. to 9ft. 1827. A handsome shrub, hardy in the South of England.

END OF VOLUME II.

THE DICTIONARY OF GARDENING,

An Encyclopædia of Horticulture.

The following are the Abbreviations used:—*fl.* flowers; *fr.* fruit; *l.* leaves; *h.* height; *deg.* degrees; *rhiz.* rhizomes; *cau.* caudex; *sti.* stipes.

The Asterisks (*) indicate plants that are especially good or distinct.

PACHIDENDRON. Included under **Aloe** (which *see*).

PACHIRA (the native name of the trees in Guiana). Syn. *Carolinea.* Ord. *Malvaceæ.* A genus comprising about fifteen species of very handsome, dense-foliaged, stove trees, inhabiting tropical America. Calyx cup-shaped, truncate or obsoletely toothed; petals white or reddish, oblong or linear, occasionally 6in. to 12in. long, often tomentose without; peduncles axillary, one-flowered, bi- or tri-bracteolate. Leaves digitate, with three to nine entire leaflets. The species (of which the four here described are the best) are commonly known as Carolineas; they thrive best in a rich, loamy soil. Propagated by large cuttings, taken off at a joint, with the leaves intact, and inserted in sand, under a bell glass, in heat.

P. alba (white). *fl.* white, strong-scented, disposed at the tops of the branches; calyx flowing with honey. July. *h.* 20ft. Brazil, 1817. A magnificent tree. (B. M. 4508.)

P. insignis (remarkable).* *fl.* pale red, downy without and smooth within; petals erect, spreading at the top; anthers white; style red. July. *l.*, leaflets five to seven, obovate-oblong. *h.* 60ft. West Indies, &c., 1795. (L. B. C. 1004, under name of *Carolinea insignis.*)

P. macrocarpa (large-fruited). *fl.* large; petals very long, white, silky outside; tube of calyx short, truncate, glandular at base; stamens yellowish-red, equal to the petals. June. *l.*, leaflets seven to eleven, oblong-obovate, cuneated at the base, acuminated at top. Mexico, 1840. Small tree. (B. M. 4549.)

P. minor (smaller). *fl.*, petals green, erect; filaments red; anthers yellow. July. *l.*, leaflets seven, elliptical-oblong, acute at both ends. *h.* 10ft. Mexico, 1798. (B. M. 1412, under name of *Carolinea minor.*)

PACHOULI. *See* **Patchouli.**

PACHYCHILUS. A synonym of **Pachystoma** (which *see*).

PACHYDERIS. Included under *Nephrodium.*

PACHYLOMA. Included under *Hymenophyllum.*

PACHYLOPHUS. Included under *Œnothera.*

PACHYNE. A synonym of **Phaius** (which *see*).

PACHYNEMA (from *pachys*, thick, and *nema*, a filament; in allusion to the thick filaments). Ord. *Dilleniaceæ.* A genus consisting of only four species of

Pachynema—*continued.*

Australian, suffruticose, often glabrous herbs. Flowers yellow; sepals and petals five; pedicels lateral, short, recurved. Leaves reduced to minute scales, or rarely a few at base of the stem, trifid. *P. complanatum*—the only species introduced—is more curious than beautiful.

PACHYNEURUM. Included under *Parrya.*

PACHYPHYLLUM (from *pachys*, thick, and *phyllon*, a leaf; referring to the consistence of the leaves). Ord. *Orchideæ.* A small genus of about six or seven species of stove, epiphytal orchids, natives of the Andes of South America. Flowers inconspicuous, bifariously disposed on short, axillary, few-flowered spikes, rarely reduced to one flower; the conniving perianth with a free, undivided, sessile lip, having a single tubercle at its base, and two at its apex, a petaloid column, and two pollen masses. Leaves thick and fleshy, arranged in two ranks, and overlapping each other. For culture, *see* **Maxillaria.** The two species introduced—*P. distichum* and *P. procumbens*—are of botanical interest only.

PACHYPHYTUM. Included under **Cotyledon** (which *see*).

PACHYPODIUM (from *pachys*, thick, and *pous*, *podos*, a foot; in reference to the thick, fleshy roots). Syn. *Belonites.* Ord. *Apocynaceæ.* A genus comprising about five species of pretty, often fleshy, stove shrubs, inhabiting South Africa and Madagascar. The species usually seen under cultivation is the one here described. It thrives best in a mixture of lime rubbish, sand, and loam. Propagated by cuttings, inserted in sand, under a hand glass. Water should be sparingly applied to Pachypodiums while in a growing state.

P. succulentum (succulent).* *fl.*, corolla red outside, and whitish on the upper surface of the limb, tinged with red. June to November. *l.* oblong, tomentose beneath, glabrous above. Stem tuberous at base. Cape of Good Hope, 1813. (B. M. 5543; B. R. 1321; L. B. C. 1676, under name of *P. tuberosum.*)

PACHYRHIZUS (from *pachys*, thick, and *rhiza*, a root; alluding to the thick, tuberous roots of the plants). Syns. *Cacara* and *Tæniocarpum.* Ord. *Leguminosæ.* A

Pachyrhizus—*continued.*

genus comprising a couple of species of tall, stove, twining herbs, one a native of Mexico, and the other widely spread throughout the warmer parts of Asia and America, and occurring also in tropical Africa. Flowers violet-blue, in clusters, on large, glandular knobs; standard broad, obovate; keel incurved, obtuse. Leaves pinnate, trifoliolate, stipellate; leaflets often angular or sinuate-lobed. Stems rising from large, tuberous roots. *L. angulatus*, the species introduced to cultivation, thrives in a light, rich soil. Propagated by cuttings, inserted in sand, under a glass; by the tubers of the roots; or by seeds.

P. angulatus (angular). *fl.* purple, in long racemes. July. *l.*, leaflets angular, sharp-toothed. Tropics, 1781. Cultivated in the tropics for its large, Turnip-like, tuberous roots, which are eaten either raw or boiled.

PACHYSA. Included under *Erica*.

PACHYSANDRA (from *pachys*, thick, and *aner*, *andros*, a stamen; referring to the thickness of the stamens). ORD. *Euphorbiaceæ*. A small genus (two species) of hardy, or nearly hardy, herbaceous plants, procumbent, or rooting at base; one is from North America, and the other a native of Japan. Flowers monœcious, apetalous, solitary and alternate under the bracts, sessile, or shortly pedicellate. Leaves alternate, stalked, rather broad, deeply toothed or rarely entire, triplinerved. The species are of more botanical than horticultural interest. They thrive in common soil, and may be increased by division of the roots.

P. coriacea (leathery). A synonym of *Sarcococca saligna coriacea*.

P. procumbens (procumbent). *fl.* white; spikes few, many-flowered, borne along the base of the stem. March. *l.* several, on slender petioles, approximate at the summit of the stem. Stems 6in. to 9in. long. North America, 1800. (B. M. 1964; B. R. 35; L. B. C. 910.)

P. terminalis (terminal). *l.* broadly cuneate-obovate, coriaceous, green, with whitish marginal variegation, crowded towards the ends of the shoots. Japan, 1882. Plant of low stature.

PACHYSTACHYS. Included under *Jacobinia*.

PACHYSTIGMA (of Hooker). A synonym of **Peltostigma** (which *see*).

PACHYSTIMA (from *pachys*, thick, and *stigma*; in allusion to the stout form of that organ). SYN. *Oreophila*. ORD. *Celastrineæ*. A genus of small, slightly branched, highly glabrous, hardy, evergreen shrubs, requiring culture similar to **Myginda** (which *see*).

P. Canbyi (Canby's). *fl.* reddish, small; petals oblong-obovate; style very short; pedicel filiform, elongated. Summer. *l.* oblong-linear, slightly denticulate. Stems surculosely creeping. Mountains of Virginia. A pretty species.

P. Myrsinites (Myrsine-like). *fl.* greenish, axillary, solitary or fascicled; calyx with a short tube and four rounded lobes; petals four, rounded, spreading; stamens four, inserted below the disk. June. *l.* opposite, very shortly petiolate, small, coriaceous, serrated or entire; stipules minute, deciduous. *h.* 1ft to 2ft. Mountains of North-west America, 1818. SYN. *Myginda myrtifolia* (H. F. B. A. i. 41).

PACHYSTOMA (from *pachys*, thick, and *stoma*, a mouth; alluding to the thick lip). SYN. *Pachychilus*. Including *Apaturia* and *Ipsea*. ORD. *Orchideæ*. A genus comprising about ten species of stove, terrestrial orchids, with erect, nodose rhizomes and simple stems; one is tropical African, and the rest are natives of the East Indies and the Malayan Archipelago. Flowers mediocre or rather large, pendulous, in a simple raceme; sepals connivent, the lateral one sometimes very shortly adnate to the base of the column; petals similar to the posterior sepals, but slightly smaller; lip affixed to, or adnate to the base of, the column, the lateral lobes oblong and erect, the middle one short. Leaves, for the most part, wanting; but the pseudo-bulbs sometimes at length bear two or three leaves. For culture, *see* **Catasetum.** The species introduced are described below.

P. speciosum (showy). *fl.* yellow, showy, usually solitary, sometimes twin, very sweetly scented; sepals nearly 2in. long, oblong, lateral ones connate with the base of the column; petals slightly narrower, obtuse; middle segment of lip oblong, obtuse, lateral ones broad, acute; scape purple, 1ft. to 1½ft. high. Winter. *l.* twin, sheathing at base, narrow-ensiform. Root succulent. Ceylon. (B. M. 5701, under name of *Ipsea speciosa*.)

P. Thomsonianum (Thomson's).* *fl.*, sepals and petals white, beautifully shining, as if varnished; lip trifid, bright purple; side laciniæ and column light greenish, striped or blotched with brown; peduncle long, velvety green, bearing a raceme of two or more large blossoms. Autumn. *l.* petiolate, oblong-acuminate. Rhizome trailing, bearing roundish, depressed, sulcate pseudo-bulbs. *h.* 6in. West Tropical Africa, 1879. (B. M. 6471.)

PACKING. There are few large gardens from which more or less of the produce has not to be sent on a journey, at least, during some part of the year; and the practice of sending small boxes of flowers or fruit has now become common amongst persons with but limited means at command. On the system of Packing adopted, the condition in which consignments reach their destination very materially depends, be they composed of plants, flowers, or fruits; consequently, it is important that due precaution should always be taken to prevent the contents of packages being rendered useless in transit, because of their being improperly or insecurely packed. The system of Packing will depend very much on the length of journey to which the articles have to be subjected, the sort of article, and the mode of conveyance. References here will only be possible in somewhat general terms; but these may be sufficient, if the principal subjects transmitted are referred to, for providing such rules, or, rather, suggestions, as may be necessary. One important condition that may be said always to apply, is Packing so that the contents cannot move about inside their covering, no matter of what it may consist. Boxes or hampers should be of a size to properly hold what is intended without crushing; but should they, in any case, be rather large, the spare room must be filled with packing material, to prevent friction, and the consequent injury that must ensue. This rule is specially important in reference to ripe or tender-skinned fruits; but it applies with almost equal force to horticultural products of every description.

Plants. Packing of plants is much more extensively the work of nurserymen than of private gardeners, as it forms part of their trade. It is essential that consignments reach their destination with as little breakage as possible; consequently, men are, in all large firms, kept purposely for this work. The plans adopted vary with plants of different sorts and sizes, some requiring more protection than others. Round, matted baskets are largely used, as they are conveniently adapted for holding plants of different heights. Each of the latter should be securely staked, and, if necessary, covered with tissue paper, the ball being kept intact by tying some moss from above it to the pot with matting or soft string. Small plants with good roots are usually quite safe, if taken from the pots and tied up in moss, and the package is, in consequence, rendered of less weight. These would, more properly, be placed in boxes, or covered hampers, so that shifting about would be impossible when once the lid was fastened. Another plan is to use paper flower-pots, which are manufactured and sold for the purpose. These are strong, made of different sizes, and are always ready for use. The plant is taken from its ordinary pot, and placed in a paper one of similar dimensions, which is provided with flaps at the top for turning over the ball. In this way, a large number of small plants may be placed in a comparatively small hamper, and the work of Packing proceeds with rapidity. When Packing round or flat-covered hampers, it is advisable to arrange the plants as much as possible with their tops towards the centre, and use sufficient packing material to keep them firm in position, the greater part of the balls of earth being thus situated

Packing—*continued.*

near the outside. Plants packed in matted baskets are usually stood upright, string being tied in both directions across the top, to keep each pot in its proper position. Living plants are usually sent to, and received from, foreign countries, in Wardian cases. Packing is here, again, an important part of the undertaking, as on it very much of the success frequently depends. The pots, in this case, should be placed as near each other as possible, and the space between them well filled in with fine loam. Afterwards, narrow strips of wood, of a suitable size, should be laid crossways, and securely nailed to ledges on the sides of the case. Large quantities of plants, such as Orchids, Bromeliads, &c., which live a long time without moisture, are successfully imported in strong packing-cases of ordinary make, bound with hoop iron.

Flowers. With these, the private gardener has much to do, particularly throughout the summer, as large quantities have to be transmitted frequently, at long distances, to meet the customary demand. With increased facilities for sending small parcels, amateurs and cottagers are also enabled to favour their less fortunate friends with flowers whenever they are sufficiently plentiful. Here, too, the condition in which flowers arrive at their destination, depends very materially on the method of Packing adopted. It is obvious that if flowers, which should travel perfectly well when properly packed, arrive in a useless state, a great waste of material is effected, and disappointment caused, that, with ordinary care, might have been prevented. Flowers that are intended for travelling are invariably all the better for being cut at least a few hours previous to being packed, and placed in water. In summer, nothing should be cut for this purpose when the sun is shining, so as to cause the least sign of flagging. Evening, or, better still, early morning, should be the time chosen. Boxes, sufficiently strong, and proportionate in size to the quantity it is intended to send, should always be used; baskets are not satisfactory, as they allow so much evaporation, and do not prevent the evil influences from outside, either of heat or cold. Different flowers vary considerably in respect of the amount of pressure they will bear. The aim should be, in all cases, to completely fill the space up to the lid, and thus prevent the contents from shaking about. Should the flowers not be sufficient to do this, clean, damp moss may be placed in the bottom, or amongst them; but a box of the proper size is preferable. Cotton wool, so often placed amongst flowers, is not to be recommended, on account of its absorbent nature. Supposing mixed flowers are to be packed together, all the heavier ones should be placed at the bottom, and others carefully arranged above them. A little light fern laid over the top, then a double sheet of tissue paper, will prepare the way for the lid, which will then lightly press everything into its place without injury. Such quickly-injured flowers as Eucharis, Gardenias, &c., where a quantity have to be packed, should be provided with shallow boxes, just deep enough for carrying single specimens. These should be laid nearly close together, and held in position with moss slightly damped, tissue paper being then put over the top, beneath the lid. Some envelop each flower in soft paper separately; but this takes up more space, and, if they travel safely, unpacking cannot be so readily accomplished. Choice bouquets, wreaths, &c., should have special boxes provided for them, in which they can be fixed, so that shifting about is an impossibility. Boxes intended for carrying flowers through the post are best made of stout tin, strong enough to withstand the stamping process, as these are found to preserve their contents fresher than any others. If cardboard boxes are used, they should be provided with a lip, or flap, at the end, to which the stamps should be affixed. Tin boxes, of various sizes, are

Packing—*continued.*

specially prepared to meet postal requirements, and their general use for flowers is recommended. Careful and close Packing is here specially an essential, as small parcels have to withstand a deal of more or less rough usage before reaching their destination.

Fruits. Besides despatching supplies of fruit, to meet family requirements, large quantities have also to be sent from various places to market, and the condition in which such consignments arrive greatly affects their value. To the system of Packing much relating to success or failure may generally be attributed, although the condition of many fruits, at the time they are packed, must not be overlooked. Such soft-skinned subjects as Peaches, Nectarines, Figs, Strawberries, &c., require most careful handling, and will not travel satisfactorily in an over-ripe state. It becomes necessary, therefore, to gather them for Packing before they are fully ripe. This, unfortunately, detracts from their quality very considerably, but it is unavoidable where the results of a railway journey are to be taken into consideration. With Grapes, it is important that their bloom should be, as much as possible, preserved. With this end in view, the bunches are frequently packed close together, in moderately deep boxes or baskets, with an inside lining, on the bottom and around the sides, of soft, dry moss, covered with tissue paper. If provision can be made for keeping the box or basket upright throughout its journey, there is no need of putting anything beneath the lid. If this cannot be insured, similar paper, and a layer of moss, should be used, as on the the sides, for filling the vacant space; but this is almost certain to destroy more or less bloom. The bunches should be close enough together in the space to prevent rubbing or shifting about. Peaches, Nectarines, and Figs, must not be over-ripe, or their skins are sure to get bruised in transit. These fruits should be packed in boxes only deep enough to take one layer. Each fruit should be carefully wrapped in tissue paper, and sometimes it becomes necessary to have a thin band of cotton wool in addition. Figs are best packed in Vine leaves, without paper or cotton wool. Boxes about 3½in. or 4in. deep are most suitable, as these afford space for a layer of dry moss in the bottom, which acts as a bed; and if the fruits do not fill up, a sheet of tissue paper, and a little more moss or cotton wool above it, should be placed beneath the lid. Strawberries are best packed in boxes holding only single layers; 2in. deep is sufficient. A quantity of soft leaves should be gathered with the fruits, or from spare plants, and allowed to wither a little. In proceeding to pack, a leaf should be put round each fruit, which should then be placed in the box, one after the other, until the space is filled. Sufficient leaves are then laid over the top to fill up to the lid. All leaves used must be dry on the surface, otherwise they will injure the fruit. Apricots and Plums may be packed like Peaches, but they are not so delicate, and suffer less readily. Cherries travel well, when not too ripe, by being simply laid close together, in very shallow boxes. When it is necessary to preserve the bloom on Plums, they may be similarly treated.

PADIA. A synonym of **Oryza** (which *see*).

PADUS. *See* **Cerasus Padus.**

PÆDERIA (from *pædor*, an offensive smell; referring to the rank odour of *P. fætida*). SYN. *Hondbessen.* ORD. *Rubiaceæ.* A small genus (five or six species) of stove, climbing shrubs, with twining stems, natives of tropical Asia, and one Brazilian. Flowers small, disposed in loose, two or three-forked cymes, produced either from the axils of the leaves or at the ends of the branches; calyx persistent, four or five-toothed; corolla tubular or funnel-shaped, hairy inside; limb of four or five spreading lobes. Fruit a small berry. Leaves opposite, rarely

Pæderia—*continued.*

ternately whorled, membranous, petiolate. The undermentioned species (the only one yet introduced) thrives in a compost of sandy loam and leaf mould. Propagated, in summer, by cuttings, inserted in sand, under a glass.

P. fœtida (stinking). Chinese Fever Plant. *fl.* deep pink, numerous; panicles axillary, opposite, short, rarely terminal. May. *fr.* broadly elliptic, compressed, polished. *l.* oblong or lanceolate, cordate at the base. Tropical Asia, &c., 1806. All parts of this plant emit a most offensive odour when bruised; the stems yield a tough, fine fibre, and the Hindoos use the roots as an emetic.

PÆDEROTA (from *Paideros*, a name applied by the ancients to a species of *Acanthus*). ORD. *Scrophularineæ*. A genus comprising only a couple of species of pretty, dwarf, hardy, perennial herbs, inhabiting the mountains of Central and Eastern Europe. Flowers yellow or blue, alternate, very shortly pedicellate, disposed in dense, terminal spikes; calyx of five narrow segments; corolla with a cylindrical tube and a sub-bilabiate limb, the upper lobe of which is entire, and the lower one three-parted. Leaves opposite, toothed or incised. The species, which are usually treated as annuals by gardeners, require a dry, airy situation, and a light sandy soil, or a compost of equal parts peat, loam, and sand. Increased by seeds.

P. Ageria (Ageria). *fl.* yellow; corolla nearly ½in. long, with erect segments; spikes short, compact. May. *l.* all acute; lower ones ovate; middle ones 1½in. long, almost 1in. broad; upper ones longer and narrower-lanceolate, cut-serrate. *h.* 6in. to 12in. 1824. Plant puberulous.

P. Bonarota (Bonarota). *fl.* blue; corolla ½in. long, with somewhat spreading segments; spikes compact, globose or oblong, 1in. to 1½in. long. May. *l.*, lower ones orbiculate; upper ones ovate or lanceolate, serrated or cut. *h.* 4in. to 6in. 1818. Plant pilose. (J. F. A. app. 39.)

PÆONIA (the old Greek name used by Theophrastus, and said to be so named after the physician Pæon, who was the first to employ the plant medicinally). Pæony, Peony, or Piony. ORD. *Ranunculaceæ*. A well-known genus of mostly hardy herbs, with a root-like, perennial caudex, or a branched, more or less woody stem; they are natives of Europe or temperate Asia, North-west America, and China. Flowers purple, white, or red, showy; sepals five, herbaceous, persistent; petals five to ten, conspicuous, broad, not pitted.

FIG. 1. FOLLICLES OF PÆONIA.

Carpels two to five; follicles dehiscent (see Fig. 1); seeds large, with fleshy albumen. Leaves alternate, ample, pinnately dissected or decompound. Mr. Baker, in the opening remarks of his admirable synopsis of the genus, which appeared in the "Gardeners' Chronicle" for 1884, says: "To-day we know about two dozen that may be considered as botanical species or sub-species. Under each of these, if brought into cultivation, there is scope for a large number of varieties, distinct from a horticultural point of view. Probably, each would vary widely in the colouring of the flower. In *P. Moutan*, *P. albiflora*, and *P. officinalis*, which are the best

Pæonia—*continued.*

known, there is red in every shade, from crimson graduating down to pink, and also pure white. Doubling may take place in any species to a greater or lesser extent by petalody of the very numerous stamens. In flowers so large as Pæonies, these changes are very conspicuous. The following is the best classification and enumeration of the forms which I am able to give; but *Pæonia*, like its neighbours, *Aquilegia*, *Aconitum*, and *Delphinium*, is what botanists call a critical genus, and the leading specific types are linked together by many intermediate connecting stages:

Sub-genus I. Shrubby.

Disk enveloping the base of the carpels.

P. Moutan.

Sub-genus II. Herbaceous.

Disk not produced to envelop the base of the carpels.

GROUP I. Follicles glabrous.

P. albiflora, P. Brownii, P. Cambessedesii, P. coriacea, P. humilis, P. leiocarpa, P. microcarpa, P. obovata, P. Wittmanniana.

GROUP II. Follicles tomentose, erect or slightly spreading.

P. anomala, P. Emodi, P. lobata, P. mollis, P. officinalis, P. paradoxa, P. peregrina, P. tenuifolia.

GROUP III. Follicles tomentose, spreading stellately when mature.

P. arietina, P. Broteri, P. corallina, P. cretica, P. decora, P. Russi, P. triternata (P. daurica)."

All the species described here may be looked upon as hardy in Britain. In the South of England, *P. Moutan* is apt to commence growth too early, and its young shoots are frequently damaged by frosts. To obviate this, light shelter, such as that afforded by a mat, &c., is necessary, during frosty weather, in spring. In some places in the north of England, no shelter is needed. The species described below are those which are, or have been, grown in this country; the names of the principal varieties are appended.

Cultivation. There are two distinct sections of Pæonies in general cultivation, both of which are exceedingly ornamental and useful for outdoor garden decoration. The Moutan, or Tree, Pæony is a sub-shrubby plant, and all the numerous varieties belonging to it are classed under its name. The other section is that of the Herbaceous Pæony, the representatives of which annually form flower-stems that also die down each year. Pæonies of any sort prefer a rich, deep soil, which should be well trenched previous to planting, and have some rotten manure incorporated. A top-dressing of the latter should also be given, and manure-water in summer is beneficial when growth is being made. Herbaceous varieties succeed in almost any position, and, when in flower, are very effective and showy subjects wherever employed. On this account, they are specially recommended for the front part of large shrubberies and plantations, and for wide, mixed borders; they may also be planted in beds by themselves, preferably in positions where an effect from a distance is that desired. Tree, or Moutan, Pæonies very frequently suffer outside from the effects of spring frosts on the tender shoots. By affording too much shelter during winter, this result has, at times, been encouraged by the plants being rendered more tender than they otherwise would be. Tree Pæonies do not succeed, or flower so well, in this country as on the Continent; the hotter summers of the latter being more favourable to their proper ripening, and early spring frosts being less destructive. A partially-sheltered situation should be selected for the plants of this section, on a lawn where some temporary covering can be used in spring. A mulching of manure over the surface soil in summer is of great help, by affording nutriment, and also preventing evaporation. Tree Pæonies may also be grown in pots for flowering under

Pæonia—*continued.*

glass early in the season; they may be gradually forced to flower in February; but this renders them useless for a similar purpose for some two or three years afterwards. To maintain an annual exhibition indoors, three sets of plants should therefore be provided, one being introduced every third year. In pots, it is almost impossible to provide a too rich soil.

Propagation of herbaceous Pæonies is effected by division; but this should not be practised more than is really necessary, because of its weakening influence on the parent plant. Large clumps soon form when they are well manured and left alone; they should not be planted too deeply. The Tree, or Moutan, varieties are grafted on the stout, fleshy roots of the herbaceous species, principally *P. albiflora* and *P. officinalis*. August is a good time to graft. The scions should be selected without flower-buds, and united to the stock-root, which should then be potted and plunged amongst ordinary soil in a frame, allowing the soil to cover the scion up a little way. If the frames are closed, and a slight shading applied, a union will generally soon take place, when air may be gradually admitted, but the plants may remain undisturbed till spring. Propagated also by layering, and sometimes by division.

FIG. 2. FLOWERING BRANCH OF PÆONIA ALBIFLORA.

P. albiflora (white-flowered).* *fl.* on a peduncle, more produced than in *P. officinalis*, often with a large, simple leaf just below the flower, and one or two large, foliaceous outer sepals; petals usually white or pink, but variable, 1½in. to 2in. broad. May and June. Follicles often three or four, less than 1in. long. *l.*, leaflets often confluent at the base, oblong, acute, 3in. to 4in. long, 1in. to 1½in. broad, glabrous, brighter green than in other species, often coloured at edges, and the veins also red; lower leaves with about five segments in each of the three divisions. Stems 2ft. to 3ft. long, glabrous, often branched, two to five-flowered. Siberia, 1548. The roots are sometimes eaten by the Mongolian Tartars. See Fig. 2. SYN. *P. edulis.* Varieties: *fragrans* (B. R. 485), *Humei=sinensis* (B. M. 1768), *tatarica* (B. R. 42), *uniflora* (B. M. 1756), *vestalis* (A. B. R. 64), and *Whitleyi* (A. B. R. 612; B. R. 630).

P. anomala (anomalous). *fl.* solitary; outer sepals produced into long, often compound, leafy points; corolla bright crimson, 4in. in diameter, with about eight obovate or oblong petals, 1in. to 1½in. broad; stamens ½in. to ⅔in. long. May. Follicles about three, ovoid, 1in. long. *l.* ten to twelve, cut into numerous confluent, lanceolate, acute segments, 1½in. to 2in. long, thirty to forty to the lower leaves, paler below. Stem 2ft. to 3ft. long. Root-tubers large, and fusiform; stolons none. Europe, &c., 1788. SYNS. *P. Fischeri, P. intermedia.* (A. B. R. 514; B. M. 1754.)

Pæonia—*continued.*

P. arietina (ram's-head-like). *fl.*, corolla dark red, 4in. in diameter. May. Follicles three or four, densely tomentose, ovoid, spreading almost horizontally from the base, 1in. long. *l.* five or six on a stem, pale green or glaucous, and pubescent beneath; segments oblong or oblong-lanceolate, copiously confluent, not more than 1in. to 1½in. broad, about thirty in the fully developed lower leaves. Stem 2ft. to 3ft. long, hairy upwards, single-flowered. South Europe. Allied to *P. peregrina.* SYN. *P. cretica* (B. R. 819).

P. Brownii (Brown's). *fl.* on a short peduncle; outer sepals leaf-like; corolla globose, not more than 1in. in diameter; petals dull red, brighter towards the edges. May. Follicles four or five, oblong, 1in. long. *l.* five or six, decompound, with very numerous, small, oblong, obtuse or sub-acute, copiously confluent segments, ⅛in. to ¼in. broad. Stems one-headed, not more than 1½ft. long, bending over till the follicles touch the ground. North America, 1826. Probably not now in cultivation. SYN. *P. californica.* (B. R. xxv. 30.)

P. californica (Californian). A synonym of *P. Brownii.*

P. corallina (coral-red). *fl.* on a short peduncle; outer sepals leafy, lanceolate, inner obtuse; petals six to eight, crimson or rose-red, obovate or sub-orbicular, 2in. to 3in. long. May. Follicles three, four, or rarely five, spreading from the base when mature, 1½in. long. *l.* five or six to a stem, glabrous, paler beneath, biternate, with nine distinct, oblong, acute segments, the side ones 1in. to 1½in. broad, the end one sometimes 2in. broad, and reaching a length of 3in. to 4in. Stem 2ft. to 3ft. long, one-headed. Tubers fusiform. Europe (not native of Britain), Asia Minor.

P. cretica (Cretan). A synonym of *P. arietina.*

P. daurica (Dahurian). A synonym of *P. triternata.*

P. decora (decorous). *fl.*, outer sepals broad, and leafy; petals six to eight, crimson, 1½in. to 2in. long, 1in. broad. May. Follicles two or three, tomentose, ovoid, very thin, diverging widely when mature. *l.* five or six to a stem, pale green or slightly glaucous, red at the margins, glabrous, or slightly pilose beneath; segments numerous and very confluent, thirty to forty to the fully developed leaves. Stem 2ft. to 3ft. long, glabrous, one-flowered. Servia, &c. Related to *P. arietina.*

P. edulis (edible). A synonym of *P. albiflora.*

P. Emodi (Mount Emodus).* *fl.* white, 3in. to 4in. in diameter; several of the outer sepals produced into leafy points; petals unequal, obovate, the outer 1½in. to 1¾in. broad. March. Follicles one or two, ovoid, ½in. in diameter. *l.* thin, glabrous, paler beneath; lower ones with twenty to thirty lanceolate, or oblong-lanceolate, very confluent, acuminate segments, 1in. to 1½in. broad. Stems 2ft. to 3ft. long, two or three-flowered when at all luxuriant. Himalayas, 1868. Rare in cultivation, but a fine plant. (B. M. 5719.)

P. Fischeri (Fischer's). A synonym of *P. anomala.*

P. humilis (dwarf). *fl.* on a short peduncle; calyx with often one to three very compound leaves from its base; petals bright red, orbicular, 2in. long. May. Carpels two or three, 1in. long, ½in. in diameter. *l.* five or six to a stem, the lower with twenty to thirty oblong, acute, copiously confluent segments, ¼in. to ½in. broad, dark green and glabrous above, pale and pubescent beneath. Stems 1½ft. to 2ft. long, one-headed, hairy towards the top. South of France, 1633. A well-known garden plant. (B. M. 1422.)

FIG. 3. FLOWERING BRANCH OF PÆONIA MOUTAN.

P. hybrida (hybrid). A form of *P. tenuifolia.*

P. intermedia (intermediate). A synonym of *P. anomala.*

P. laciniata (torn). A form of *P. tenuifolia.*

P. lobata (lobed). A form of *P. officinalis.*

P. mollis (soft). *fl.* like those of *P. officinalis* and *P. peregrina*, but smaller and duller in hue. May. Follicles similar, densely pilose. *l.* five or six, crowded, dull green above, glaucous and

Pæonia—*continued.*

densely pubescent beneath, cut into thirty to forty oblong-lanceolate segments, ⅜in. to 1in. broad. Stem about 1ft. long, one-headed, densely pilose. Not very distinct from *P. paradoxa*. (B. R. 474; L. B. C. 1263.)

FIG. 4. FLOWERING BRANCH OF PÆONIA MOUTAN.

P. Moutan.* Moutan Pæony. *fl.* various in colour, very large. May. Carpels small, numerous, densely pilose. *l.*, leaflets entire at base, often cut in the upper part into oblong, acute segments, glabrous on both surfaces, moderately firm, not at all decurrent on the rachis. Stems shrubby, copiously branched. *h.* 3ft. Widely cultivated in China and Japan. 1789. Fig. 3 represents a single-flowered, and Fig. 4 a double-flowered, variety of this beautiful species. (B. M. 1154.) Garden varieties: *Anneslei* (T. H. S. vi. 482, 7), *Banksii* (A. B. R. 448; B. R. 379), *Humei, papaveracea* (A. B. R. 463; B. M. 2175; L. B. C. 547), *Rawesii*, and *rosea* (A. B. R. 373; L. B. C. 1035).

P. officinalis (officinal).* *fl.*, sepals unequal, the inner obtuse, the outer acute and leaf-like; petals dark crimson, much imbricated, obovate or nearly orbicular, 1½in. to 2in. broad; stamens ½in. long; anthers rather shorter than the filaments. May. Carpels two or three, ovoid, densely tomentose, 1in. long when mature. *l.* five or six to a stem, glabrous, paler beneath, the lowest with fifteen to twenty lanceolate or oblong-lanceolate, acute, confluent leaflets, 1in. to 2in. broad. Stem stout, one-flowered, glabrous, 2ft. to 3ft. long. South Europe, 1548. The commonest species in gardens, especially in the double-flowered form. (B. M. 1784.) *P. lobata* is regarded by Mr. Baker as a dwarfer variety, with narrower and more numerous leaf segments.

P. paradoxa (paradoxical). *fl.* on very short peduncles. May. *l.*, lower ones cut up into from thirty to forty acute, confluent

FIG. 5. FLOWERING BRANCH OF PÆONIA TENUIFOLIA FLORE-PLENO.

Pæonia—*continued.*

segments, ½in. to ¾in. broad, the largest not more than 1½in. to 2in. long. Stem 1ft. to 1½ft. high, with never more than a single flower. Otherwise like *P. peregrina*, of which it is "not in any broad sense more than a variety" (Baker). (S. B. F. G. 19.)

P. peregrina (foreign). *fl.* on a short peduncle; inner sepals orbicular, ¾in. to 1in. long, outer with leafy points; petals five to ten, bright crimson, 2in. long, 1½in. to 2in. broad. May. Follicles two or three, erect-arcuate, ½in. in diameter; stigmas folded together. *l.* five or six to a stem, dull green and glabrous above, pale and pilose beneath, the lower with fifteen to twenty oblong, acute segments, 1in. to 1½in. broad, the longest 3in. to 4in. long. Stem 1½ft. to 2ft. long, one-headed, pubescent towards the top. South Europe, 1629. Common in cultivation. (B. M. 1050.) SYN. *P. pubens* (B. M. 2264).

P. pubens (downy). A synonym of *P. peregrina*.

P. Russi (Russ's). Follicles finely pubescent. *l.* thin in texture; segments ovate or oblong. Stem 1ft. to 1½ft. long. Otherwise like *P. corallina*, of which, according to Mr. Baker, it is scarcely more than a variety. Sicily, &c.

P. tenuifolia (slender-leaved).* *fl.* solitary, erect, surrounded by the crowded, reduced upper leaves; sepals orbicular, ½in. to ¾in. long; petals dark crimson, elliptic-cuneate, 1½in. long; anthers shorter than the filaments. June. Follicles two or three, not more than ½in. long. *l.* ten to twelve, cut up into very numerous, linear, one nerved, confluent segments, less than one line broad. Stems one-headed, glabrous, 1ft. to 1½ft. long, densely leafy up to the flower. Root-tubers fascicled, with creeping stolons. Transylvania to the Crimea, &c., 1765. A well-known and very distinct type. (B. M. 926.) *P. hybrida* and *P. laciniata* are varieties with broader leaf-segments. The double state, a handsome garden plant, is shown in Fig. 5.

P. triternata (triternate). *fl.*, outer sepals leaf-like, inner obtuse; petals six to eight, rose-red, obovate, 2in. to 2½in. long. May. Follicles two to four, densely tomentose, spreading from the base when mature. *l.* five or six to a stem, glabrous, pale green above, glaucous beneath, with broad, oblong or obovate leaflets, obtusely rounded at the apex, with a small cusp, not confluent at the base; the side ones often 2in. broad, and the end one obovate or orbicular, 3in. to 4in. long and broad. Stem 1½ft. to 2ft. long, one-flowered, glabrous. Tubers thick. Caucasus, &c., 1790. Allied to *P. corallina*. SYN. *P. daurica*. (A. B. R. 486; B. M. 1441.)

FIG. 6. FLOWERING BRANCHES OF PÆONIA WITTMANNIANA.

P. Wittmanniana (Wittmann's).* *fl.* borne on a short peduncle; sepals orbicular, the longest over 1in. long; petals orbicular, yellowish-white, 2in. long; filaments longer than the small anthers. April. Carpels glabrous, with a small, spirally-curved stigma. *l.*, lower ones biternate, with usually not more than three segments in each division; leaflets thin, often 1½in. to 2in. broad, ovate, acute, dark green and glabrous above, hairy below. Stems one-headed. *h.* 2ft. Caucasus and North Persia, 1842. A well-marked species, but rare in cultivation. See Fig. 6. (B. M. 6645.)

Varieties. These are very numerously represented in both of the sections to which reference has been made in the foregoing cultural notes. Many produce flowers of an extraordinary size, and colours range in them through almost every variety and shade; they are also fragrant, and well adapted for travelling in a cut state. Subjoined is a selection, which comprises many of the best sorts:

Double Herbaceous Pæonies. June-flowering (varieties of *P. albiflora*). AMABILIS, satin rose; AMBROISE VERSCHAFFELT, rich purple, fragrant; ATROSANGUINEA, purple, golden anthers; AUGUSTE VAN GEERT, rose-pink; BELLE DOUAISIENNE, white, laced purple; BLANC, pure white (see Fig. 7); BOSSUET, magenta-rose; BUCKII, intense crimson-purple, rose scented; CARNEA ELEGANS, delicate pink, shading to white; CHARLES BINDER, rich magenta-rose; DECAISNE, deep rose, fragrant; DECANDOLLE, fine rose,

Pæonia—*continued.*

shading to pink, fragrant; DR. BRITONNAU, satin rose, centre white; DUCHESSE DE MODENA, rose, centre blush; ECLATANTE, rich purple; EDULIS, white; EDULIS FRAGRANS, deep rich rose; ETENDARD DU GRAND HOMME, brilliant rose, very large, rose-scented; FESTIVA MAXIMA, pure white, fragrant; FORMOSA, blush, centre primrose; FULGIDA, deep rose; GENERAL BEDEAU, rose, centre sulphur, very fragrant; GLOBOSA, deep pink, centre florets primrose; GLOIRE DE DOUAI, deep crimson, golden anthers; GRANDIFLORA NIVEA, white, tinged rose; HENRI IV., blush pink; HUMEI, scarlet-crimson, very dwarf; INCOMPARABILIS, rose, shaded purple, fragrant; INSIGNIS, rose-carmine, rose-scented; ISIDORE LEROY, crimson-purple; LOUIS VAN HOUTTE, purple-crimson; MADAME BOUCHALET AINE, rich purple-crimson, fragrant; MADAME CALLOT, white, tinged rose, rose-scented; MADAME DE MONTIJOU, blush, centre white; MADAME SCHMIDT, purple-crimson, showy golden anthers, fragrant; MADAME VILMORIN, blush, centre white; NOBILISSIMA, full deep rose; PAPAVERÆFLORA, white, centre primrose; PRINCE CHARLES, rose-purple, centre chamois; PRINCE PROSPER, purple-magenta, golden anthers; PULCHERRIMA, guard petals blush, centre white, rose scented; PURPUREA SUPERBA, rich glowing purple, fragrant; REINE DES ROSES, guard petals deep rose, centre chamois-rose; ROSEA MAXIMA, pink, inner florets white, tinged rose; ROSEA PRÆCOX, rose, early flowering; THE QUEEN, blush rose, very large, rose-scented; TRIOMPHE DE L'EXPOSITION DE LILLE, rich purple, fragrant.

Hardy European Pæonies. May-flowering (varieties of *P. officinalis*). DOUBLE ANEMONE-FLOWERED, large, rich crimson; petals somewhat irregular. DOUBLE RED, flowers large, rich crimson; abundantly produced; a very old variety. DOUBLE ROSE, flowers opening full rose, and chauging to flesh colour; large and fine. DOUBLE WHITE, flowers large, opening pale pink, and changing to pure white.

Moutan, or Tree-Pæonies. May-flowering (varieties of *P. Moutan*). ALBA LILACINA, ATROPURPUREA, BEAUTY OF CANTON, BLANCHE NOISETTE, CANDIDA, CARNEA PLENA, COUNTESS OF CRAWFORD, ELIZABETHA, EMPEROR OF CHINA, GLORIA BELGARUM, INCARNATA PLENA, LACTEA, MANDARIN, MAXIMA PLENA, OCELLATA, OSIRIS, PRIDE OF HONGKONG, REINE DES FLEURS, ROBERT FORTUNE, SALMONEA, SNOWBALL, SOUVENIR DE GAND, SPECIOSISSIMA, STELLA, TRIOMPHE DE MILAN, VERSICOLOR PLENA, VILLE DE VERSAILLES, VIOLACEA PURPUREA, VIVID, ZENOBIA.

FIG. 7. FLOWERING BRANCH AND DETACHED FLOWER OF PÆONIA ALBIFLORA FLORE-PLENO "BLANC."

PÆONY. *See* **Pæonia.**

PÆSIA. Included under **Pteris** (which *see*).

PAGINA. The surface of any flat body; *e.g.*, that of a leaf.

PAGLE. An old name for the Cowslip, *Primula veris.*

PAGODA-TREE. A name applied to *Ficus indica*, *Plumeria alba*, and *Sophora japonica.*

PAIGLE. An old name for the Cowslip, *Primula veris.*

PAINTED. A term applied in cases where colours are arranged in streaks of unequal density.

PALAFOXIA (named after José Palafox, a Spanish general, 1780-1847). SYN. *Paleolaria.* ORD. *Compositæ.* A genus comprising half a dozen species of hardy, or nearly hardy, erect herbs, rarely shrubby at base, natives of Mexico and Florida. Flower-heads white, flesh-colour, or purple, small or mediocre, loosely corymbose-paniculate; involucre turbinate-campanulate, the bracts one or two-serrate; receptacle small, flat, naked, or scarcely foveolate. Leaves alternate, or the lower ones opposite, narrow, entire. The undermentioned species, which are the only ones worth growing, thrive best in a warm border of sandy soil, and should be treated as half-hardy annuals. Seeds should be sown, in a gentle heat, during April, and the young plants placed in the open, about 1ft. apart, early in June.

Palafoxia—*continued.*

FIG. 8. PALAFOXIA HOOKERIANA, showing Inflorescence and Disk and Ray Florets.

P. Hookeriana (Hooker's). *fl.-heads* rosy-pink, freely produced in loose clusters. Summer. Stems very bushy, about 2ft. high. Rocky Mountains, 1855. A very pretty, dwarf-growing, dense-habited plant. See Fig. 8. (B. M. 5549.)

P. linearis (linear). *fl.-heads* flesh-colour; involucre oblong; pappus scales eight, unequal, acuminate. June. *l.* linear, entire, obtuse. *h.* 2ft. Texas. Plant shrubby, cinereo-pubescent. (B. M. 2132.)

PALATE. A projection in the throat of a personate gamosepalous corolla.

PALAVA (named in honour of A. Palau y Verdera, professor of botany at Madrid in the last century). ORD. *Malvaceæ.* A small genus (three or four species) of tomentose or nearly glabrous, hardy or half-hardy, annual herbs, natives of Peru or Chili, and with habit similar to *Cristaria.* Flowers purple, pedunculate, axillary, solitary; calyx five-fid. Leaves often lobed, sinuate, or dissected. The species thrive in ordinary garden soil. Propagated by seeds, sown on a hotbed in early spring, the seedlings being transplanted to the open border in May.

P. flexuosa (flexuous-stemmed). *fl.* light mauve, pale towards the centre, with bright red anthers and bases of the petals; sepals purple at base, very much smaller than the obliquely truncate petals. June. *l.* on slender petioles, 1in. to 2in. long; blade 1in. to 2in. long and broad, oblong-ovate or triangular-ovate, pinnatifid, with one or two pairs of spreading, lobed, or irregularly pinnatifid segments. Stems 8in. to 10in. long. Peru. 1866. (B. M. 5768.)

P. rhombifolia (rhomb-leaved). *fl.* large, scentless; corolla rose-coloured, flat, thrice as long as the calyx; petals five, obovate, cuneate; peduncles solitary, axillary. Summer. *l.* 1¾in. long, rhomboid, soft. Stem prostrate, branched, hairy. Peru, 1830. (B. M. 3100; B. R. 1375.)

PALAVA (of Ruiz and Pavon). A synonym of **Saurauja** (which *see*).

PALEACEOUS. Covered with paleæ, *e.g.*, the receptacle of many of the Composites.

PALEÆ. Membranous scales, like chaff. The term is also applied to the inner scales of the flowers in grasses.

PALE FLAX. *See* **Linum angustifolium.**

PALEOLARIA. A synonym of **Palafoxia** (which *see*).

PALE TUSSOCK MOTH. *See* **Tussock Moths.**

PALIAVANA (said to be so called from Palhava, a seat of the Prince of Braganza, a patron of botany). SYNS. *Codonophora, Prasanthea.* ORD. *Gesneraceæ.* A small genus (only two species) of stove, shrubby plants, natives of Brazil. Flowers large, solitary or fasciculate in the axils of the bracts, disposed in loose, terminal racemes; calyx campanulate, the base adnate to the ovary, the five lobes at length reflexed or deciduous; corolla (generally) greenish, loosely pubescent or densely silky-villous, with a funnel-shaped or almost campanulate tube, and an oblique, broadly five-lobed limb. Leaves opposite, rather thick, soft, crenate, villous; floral ones reduced to bracts. For culture of *P. prasinata*—the only species which has been introduced to our gardens—*see* **Gesnera.**

P. prasinata (greenish). *fl.* borne on axillary pedicels, which are two to four times shorter than the corolla, which is greenish, darkly dotted externally, and has an ample campanulate limb. May to July. *l.* opposite, oval-lanceolate or ovate, serrate, shortly petiolate, velvety beneath. *h.* 1½ft. to 2ft. 1818. (B. R. 428, under name of *Gesnera prasinata.*)

PALICOUREA (named after Le Palicour, of Guiana). SYNS. *Colladonia, Galvania and Stephanium.* Including *Nonatelia* and *Rhodostoma.* ORD. *Rubiaceæ.* A genus comprising about 100 species of stove, tropical American shrubs, of variable habit, with terete or four-angled branchlets. Flowers variously coloured (never blue), small or rather large, disposed in sessile or usually pedunculate, terminal or rarely axillary, compound corymbs, racemes, or thyrses; calyx with a hemispherical or turbinate tube, and an entire or five-lobed limb; corolla tube elongated, straight or curved, the limb of five short or elongated, simple or valvate lobes. Fruit a globose, rarely oblong, berry. Leaves opposite or whorled; stipules variable. The following species are occasionally seen in cultivation; they thrive best in a sandy-loam and peat compost. Propagation may be effected, in spring, by cuttings, which should be inserted in sand, under a glass, in a gentle hotbed.

P. apicata (crowned-fruited). *fl.* yellow, in cymose, sessile panicles. June to August. *l.* oblong, short-acuminated, narrow at the base, coriaceous. Branches terete. *h.* 4ft. to 6ft. Caraccas, 1824.

P. crocea (saffron-coloured). *fl.* orange, on terminal, corymbose, saffron-coloured peduncles. June. *l.* ovate or ovate-lanceolate, acuminated, stiffish, with prominent veins. *h.* 4ft. to 6ft. West Indies, &c., 1823.

P. gardenioides (Gardenia-like). *fl.* white, disposed in mostly terminal cymes; corolla much longer than the calyx, tubular, funnel-shaped. Winter and summer. *l.* opposite, obovate-lanceolate, acuminate, attenuated into the short petioles, dark green and shining above, paler beneath. *h.* 2ft. South America, 1759. SYN. *Rhodostoma gardenioides.* (G. M. B. 1850, 65.)

P. lutea (yellow). *fl.* yellow, disposed in erect panicles; corolla tube narrow at the base, long; segments of the limb acute. June and July. *l.* broad-ovate, acuminated; stipules bluntly two-lobed. *h.* 1ft. French Guiana, 1823.

P. ornata (adorned). *l.* elliptic, acuminate, narrowed towards the base, of a satiny olive-green, with the costa and principal veins deep rosy-crimson, the olive tint passing into emerald-green near the base of the midrib; under surface purple. Stems erect, purplish, terete. South America, 1875.

P. Pavetta (Pavetta). *fl.* white, very sweet-scented, with a funnel-shaped corolla, which is a little curved; corymbs terminal, pedunculate, with brachiate, trichotomous branches. August. *l.* ovate-lanceolate, acuminated, thin, nerved. Branches terete. *h.* 2ft. West Indies, &c., 1823.

P. racemosa (racemose). *fl.* white, small, bracteolate at the base; thyrse panicled, a little longer than the petioles. June. *fr.* globose, five-angled, five-celled. *l.* elliptical-oblong, acuminated at both ends, petiolate. *h.* 2ft. to 3ft. Guiana, 1818.

P. rigida (stiff). *fl.* yellow; panicles on long peduncles, spreading; corolla clothed with very fine down. August. *l.* elliptic, acutish, rounded at the base, almost sessile, coriaceous. Branches bluntly tetragonal. *h.* 3ft. Tropical South America, &c., 1820.

Palicourea—*continued.*

P. violacea (violet). *fl.* white, bracteate; thyrse many-flowered, about half the length of the leaves. Berries violet, about the size of currants. June and July. *l.* elliptic, acuminated, tapering into the short petioles at the base. *h.* 4ft. to 5ft. Guiana, 1824.

PALISOTA (named in honour of Palisot de Beauvois, 1752-1820, a French botanist and traveller). SYN. *Duchekia.* ORD. *Commelinaceæ.* A genus comprising eight species of stove, perennial herbs, natives of tropical Africa. Flowers, small, numerous, disposed in simple, scorpioid cymes, sessile or shortly pedicellate; sepals and petals distinct, almost equal, similarly coloured, spreading; peduncles one or two in a leafy fascicle; panicle narrow, thyrsoid, oblong or cylindrical. Berries sometimes scarlet or blue. Leaves clustered at the tip of the stem; sheath imbricated, often long-pilose. The best-known species are described below. For culture, *see* **Commelina.**

P. Barteri (Barter's). *fl.* pale purplish, in an oblong, dense, thyrsoid raceme, borne on a short, terminal, solitary peduncle. Autumn. *l.* all radical, 1ft. to 2ft. long, obovate-oblong or elliptic-lanceolate, narrowed into petioles of variable length, attenuated at the apex into a long, slender point, more or less silky-hairy. *h.* 1ft. to 3ft. 1862. Plant almost stemless. (B. M. 5318.)

P. bicolor (two-coloured). *l.* oblong-obovate, tapering at the base to the stalk, and more abruptly towards the apex, 12in. to 14in. by 5in.; the upper surface bright green, with a broad, central disk of greenish-yellow; margins studded with stiff, brownish hairs; petiole fleshy, 4in. to 5in. long, with a broad, purplish band studded with coarse, brownish pubescence. *h.* 1ft. to 2ft. Fernando Po, 1878. An elegant, ornamental-leaved plant.

P. bracteosa (bract-bearing). *fl.* white, resembling those of *P. Barteri*, woolly outside at base; panicle shortly peduncled, very dense, ovate. Autumn. *l.* narrow-obovate, acuminate, white-cobweb-woolly. 1879. Plant stemless.

PALIURUS (the old Greek name used by Theophrastus). SYN. *Aubletia.* ORD. *Rhamneæ.* A genus comprising a couple of species of sub-erect or decumbent, glabrous or slightly tomentose, hardy shrubs, armed with stipular prickles; one is a native of South Europe and Western Asia, and the other of South China. Flowers small, five-parted; pedicels axillary, fasciculate, or in short, aggregated cymes. Fruit hemispherical, coriaceous. Leaves sub-distichous and alternate, petiolate, ovate or cordate, three-nerved, crenulated, with two thorns at the base of each, either both erect, or one erect and the other recurved. *P. aculeata* is supposed by some writers to have furnished the crown of thorns which was placed on the head of Christ before His Crucifixion. The species grow in any ordinary soil. Propagation may be effected by layers, by cuttings of the roots, or by seeds.

P. aculeatus (prickly). Christ's Thorn; Garland Thorn. *fl.* greenish-yellow; umbellules axillary, few-flowered, crowded. June and July. *fr.* resembling a head on which is a broad-brimmed hat. *l.* ovate, serrulated, quite smooth, three-nerved, with two spines at their base, one erect, the other hooked. Branchlets pubescent. *h.* 8ft. Mediterranean region, 1596.

P. Aubletia (Aublet's). *fl.* greenish-yellow, in axillary corymbs. July and August. *l.* obliquely cordate or elliptical, three-nerved, shining, serrulated, with two thorns at the base of each, one erect, the other recurved. Branches smooth. *h.* 10ft. South China, 1819. SYN. *P. virgatus* (B. M. 2535).

P. virgatus (twiggy). A synonym of *P. Aubletia.*

PALLASIA (of Linnæus the younger). A synonym of **Calligonum** (which *see*).

PALLASIA (of Houttuyn). A synonym of *Calodendron.*

PALLAVIA. A synonym of **Pisonia** (which *see*).

PALLAVICINIA. A synonym of *Cyphomandra.*

PALLENIS (from *palea*, chaff; in allusion to the chaffy receptacle). SYNS. *Asteriscus, Athalmus.* ORD. *Compositæ.* A monotypic genus. The species is a soft, sub-silky, villous, hardy, annual herb. For culture, *see* **Buphthalmum.**

P. spinosa (spiny). *fl.-heads* yellow, mediocre or rather large, solitary at the tips of the branches; achenes glabrous or slightly pilose; involucre hemispherical; receptacle slightly convex. July. *l.* obovate- or oblong-lanceolate, alternate, entire; floral

Pallenis—*continued.*

ones, or outer involucral bracts, leafy, often pungently mucronate. *h.* 2½ft. Orient, South Europe, and North Africa, 1570. (S. F. G. 898, under name of *Buphthalmum spinosum.*)

PALM. A general name for the members of the family *Palmæ.*

PALM. A measurement equalling 3in., or the breadth of the four fingers of the hand.

PALMA-CHRISTI. *See* **Ricinus communis.**

FIG. 9. COCOS WEDDELIANA.

PALMÆ, or **PALMACEÆ.** This large order is pre-eminent, not only among monocotyledons, but in the whole world of plants, for the grandeur and beauty attained by many of the species. The order is also pre-eminently tropical in its distribution, so that, to dwellers in the cooler temperate zones, its wonderful beauty is a thing to be read of, not to be realised. Palms under glass, however spacious the accommodation allowed them, fail to impress the mind as do the same subjects in their native forests. Those who have had the pleasure of seeing these "Princes of the Vegetable Kingdom," as Linnæus rightly styled them, in their native wilds, must feel that the impressions produced can never be effaced from the memory. While some tower, when full grown, to a height much surpassing 100ft., without emitting a leaf (*e.g.*, *Ceroxylon andicola*), the stems of others do not exceed 2ft. or 3ft. in length, and ¼in. in thickness; others, again, have the stems so short that the leaves borne on the top of the stem rise out of the soil, and the whole plant does not exceed 3ft. in height. These dwarf Palms, however, are no less graceful than their lofty allies, and are, moreover, better known than the latter in European greenhouses, for which their dwarf stature so well fits them.

The stem is usually unbranched from the ground to the top, but in the *Hyphæne thebaica* it bifurcates

Palmæ—*continued*.

several times, and it also does so in a few others. Once formed, the trunk of a Palm increases in height, but not in thickness, and it tapers upwards almost from the base. In most, the stems rise erect, or are only slightly curved; but in certain weak-stemmed genera, the stems lie on the soil, or twine among the branches of adjacent trees for support (*e g.*, *Calamus*, *Desmoncus*, &c.). The outer surface of the trunk in Palms is usually very hard, while the centre is soft, and consists of a mass of thin-walled cells, amid which run the woody bundles. The central mass can be easily removed, leaving a hollow tube. The leaves vary no less than the stems; but they belong to two leading forms, viz., the *feather-veined*, in which the chief veins of the leaf-blade arise from the sides of a long midrib (see Fig. 9), and the *fan-veined*, in which the midrib is so short that, at first sight, the veins all seem to arise from the top of the leaf-stalk, and to spread out like

FIG. 10. LIVISTONA AUSTRALIS.

the ribs of a fan through the leaf-blade (see Fig. 10). In both forms, the blade may be undivided, except at the end, where there are always two lobes, separated by a division down to the midrib; or it may be divided partially, or down to the midrib along each side, and these segments, or pinnæ, may be few (as in Fig. 11) or many (*see* Fig. 9), and they may themselves be divided into smaller segments, as in *Caryota* (see Fig. 12). In length, the leaves vary between less than 1ft. (*e.g.*, in species of *Malortiea*) and a total of nearly

Palmæ—*continued*.

40ft. (as in the leaves of young plants of *Maximiliana regia*). The undivided lamina may, in a few species, reach a size of nearly 30ft. long by 5ft. broad (*e.g.*, in *Manicaria saccifera*). The leaves in the very young plants of almost all species of Palms are undivided,

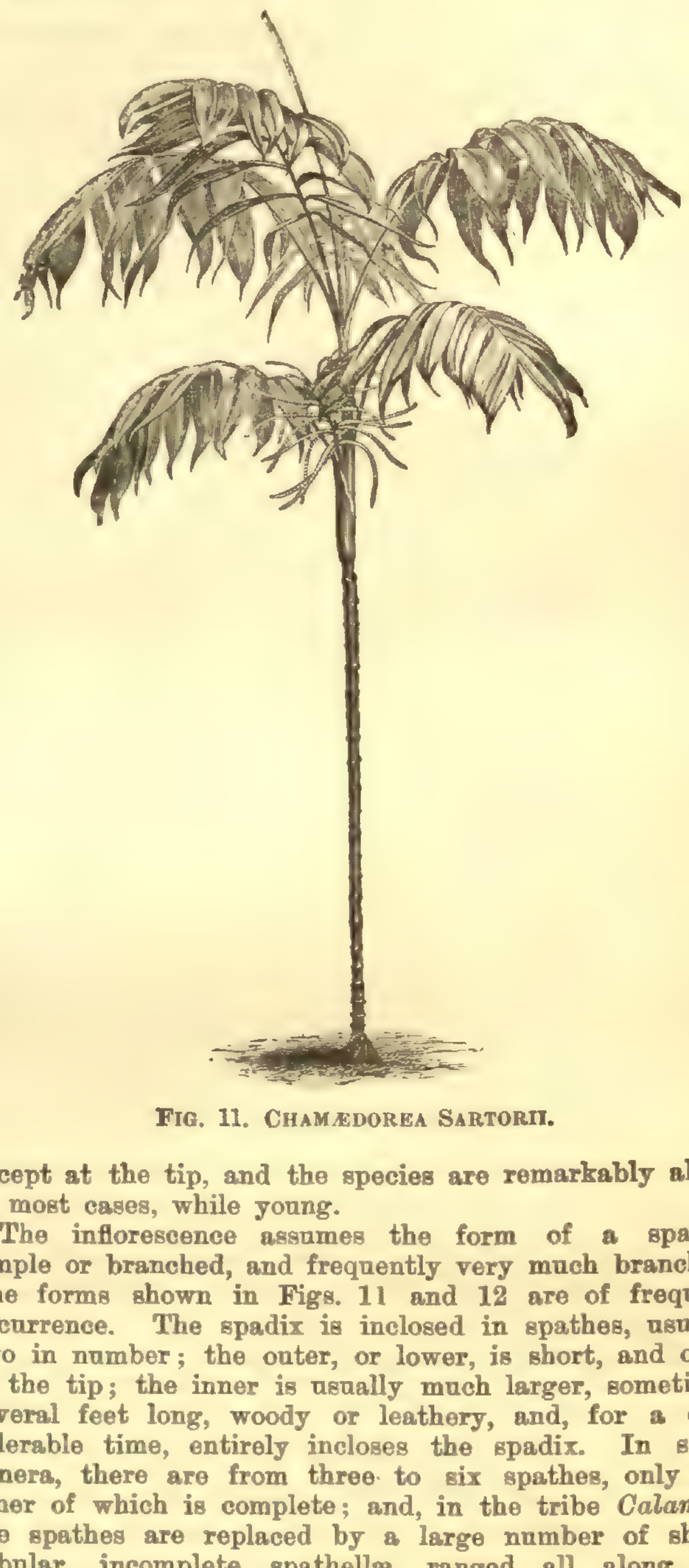


FIG. 11. CHAMÆDOREA SARTORII.

except at the tip, and the species are remarkably alike, in most cases, while young.

The inflorescence assumes the form of a spadix, simple or branched, and frequently very much branched. The forms shown in Figs. 11 and 12 are of frequent occurrence. The spadix is inclosed in spathes, usually two in number; the outer, or lower, is short, and open at the tip; the inner is usually much larger, sometimes several feet long, woody or leathery, and, for a considerable time, entirely incloses the spadix. In some genera, there are from three to six spathes, only the inner of which is complete; and, in the tribe *Calameæ*, the spathes are replaced by a large number of short, tubular, incomplete spathellæ, ranged all along the peduncle and branches. The spadix always bears numerous inconspicuous flowers, which, in by far the greater number of species, are unisexual, not often hermaphrodite. Individual plants, or individual spadices in many species, are either male or female; but, in most, the same spadix bears flowers of both sexes, the females usually lower down, the males nearer the tips of the branches; or they may be associated in various ways, *e.g.*, in *Cocoinæ*, *Geonoma*, &c.; there is frequently a male flower at each side of a female, so that they stand in groups of three. They are often sunk in pits in the fleshy spadix, or they may be stalked; the flowers are almost always quite regular in structure. Frequently, the abortive male organs are found in female flowers, and *vice versâ*. The stamens are usually six, but vary

Palmæ—*continued.*

from three to very many. The ovary is typically composed of three carpels, rarely of more; but, usually, only one grows to ripeness, and only the remains of the others are left in the ripe fruits. These vary greatly. In certain groups, they resemble berries; in others, they are more like drupes, with a hard inner layer, or endocarp, as in the well-known Cocoa-nut and the Coquilla-nut, so often used for carved ornaments. The outer coat of the fruit is usually thin, leathery or dry, and smooth, or only bears prickles; but, in *Calameæ*, it is covered with scales, arranged in spirals. The middle layer of the fruit (mesocarp) is usually traversed by woody

FIG. 12. CARYOTA SOBOLIFERA.

bundles, which, in some, are extremely abundant, and, in others, rather few and ill-developed. In the Cocoa-nut, this layer is very thick and fibrous, and, from it, "coir," or fibre, for ropes, matting, &c., is prepared. In many Palms, the mesocarp contains oil in considerable quantity. The fruits of the "Oil Palm" (*Elaëis guineensis*) yield so much that they form a valuable export from West Africa, for use in candle-making, &c. There is usually only one ripe seed in each fruit, those in the abortive ovaries remaining undeveloped; but, occasionally, two or more may ripen. The seeds are large, but the embryo is usually small, and is sunk in

Palmæ—*continued.*

a pit in the large perisperm, or albumen. This latter is white, or may be streaked with brown. In some it is fleshy (Cocoa-nut), in others horny (Date); and in the "Ivory Palms" (*Phytelephas*) it is so compact and hard as to be very largely used as a substitute for real ivory, in the manufacture of billiard balls and many other articles.

A noteworthy peculiarity of many Palms is that they have the stems, leaves, and even the spathes and fruits, covered with sharp prickles, usually of a dark colour, which form a most efficient defence against enemies. In some kinds (*e.g.*, *Astrocaryum Jauari*, &c.), the prickles on the trunk may reach a length of nearly 1ft., and a breadth, at the base, of nearly ½in. In certain climbing Palms (species of *Calamus* and *Desmoncus*, for instance), the prickles are hooked, or so placed as to assist the plants in climbing; but aid in this is still more efficiently given in *Desmoncus* and a few *Chamædoreæ* by certain leaflets, near the end of the leaf, being altered to form strong, recurved hooks. *Palmeæ* are not very closely related to any other order: *Juncaceæ* seem, on the whole, most nearly allied to them. There are from 1100 to 1200 recorded species, though a considerable number of these are not well known. They are almost confined to the tropics, extending beyond these limits in exceedingly reduced numbers. *Chamærops humilis* is the only species native in Europe, where it reaches 44deg. N. Lat. The limits of latitude elsewhere are about 34deg. N. in Asia, 36deg. N. in America, 34deg. S. in Africa, 37deg. S. in S. America, in Chili, and 44deg. S. in New Zealand.

The leading genera of Palms are noticed in this work, in so far as they are of interest to gardeners; they are too numerous to be repeated here; but several of the more important genera are referred to in this article. Among the richest in species are: *Astrocaryum*, *Attalea*, *Bactris*, *Calamus*, *Caryota*, *Chamædorea*, *Cocos*, *Desmoncus*, *Geonoma*, *Hyphæna*, *Korthalsia*, *Licuala*, *Livistona*, *Phœnix*. In addition to these, there are many genera that, despite the small number of species included in them, are of importance, either as greenhouse plants, or because of their useful products. The genera are almost confined to either the Old World or the New: *Raphia*, among *Calameæ*, and *Elaëis* and *Cocos*, among *Cocoinæ*, alone breaking this rule, out of 132 genera recognised in Bentham and Hooker's "Genera Plantarum." In each case, only one species is common to the two hemispheres. These species are *Cocos nucifera* (Cocoa-nut), *Elaëis guineensis* (Oil Palm), and *Raphia vinifera*.

The uses of Palm-trees, and of their products, to natives of tropical lands, are far beyond what it is possible for residents in temperate regions to conceive. The stems of some supply the timber used in building houses, or the laths for forming partitions; while the tough stems, or rind of the stems, of others supply strong cordage for binding together the beams, for chair-making, and for many other household purposes. The stems of others split, and each half hollowed, make aqueducts; and of others the South American Indians make their blow-pipes for shooting out poisoned arrows. The leaves are largely used for thatch, or for walls of houses; for making fans, umbrellas, household utensils, and even tents. From the young leaves of various species fibres are largely prepared, which are used for making hammocks and other durable articles. The leaf-blades of a few are used as paper in the East; and the fibres of several species are employed in paper-making. The coarse, woody bundles that surround the stems of two American Palms are used largely for making besoms, under the name "Piassába fibre." Two American Palms produce vegetable wax in such abundance as to be worth collecting for sale and export. In *Ceroxylon andicola*, the

Palmæ—*continued.*

wax is formed on all parts of stem and leaves; in *Copernicia cerifera*, it is found only on the leaves. An Eastern Palm (*Calamus draco*) yields a resinous, red substance, known as "Dragon's Blood," of an astringent nature, exuded from stems and fruits. Reference has already been made to the preparation of coir from the cocoa-nut, and to the uses of Coquilla-nut kernels, and of the perisperm of the Ivory-Palm, for carved ornaments, &c. As yielding food to human beings, Palms are not less valuable. The softer tissues of the interior of the stems of many trees contain large quantities of starchy stuffs, which, when prepared, form the well-known Sago. The greater part of that brought to Europe is obtained from *Metroxylon læve* and *M. Rumphii*. The seedling plants of the Palmyra Palm (*Borassus flabelliformis*), and the tender tissues of the terminal bud of many Palms, are cooked and eaten in various regions of the tropics. A sweet juice, containing a large amount of sugar, is obtained from cuts in the young tissues of many Palms. When allowed to stand, the juice ferments, and forms a drink much used under the name of Palm-wine or Toddy. The fruits of several species of *Palmeæ* afford valuable articles of food. Pre-eminent among these are the Date, either fresh or preserved, since it forms the chief food of multitudes of persons in Northern Africa. The perisperm of the Cocoa-nut forms a great part of the food of various other tropical races. Of less importance as food are the fruits of the Peach Palm, and of certain other Palms of America; but even these form a valuable resource, at times, to the native races. From the fruits and seeds of many Palms a large amount of oil can be expressed. The oil obtained from the Oil Palm, as already mentioned, is a valuable article of commerce, and that from several other species is also suitable for use, though not so abundantly produced. From the fruits of certain kinds (*Elaëis melanococca*, *Euterpe edulis*, *E. oleracea*, *Œnocarpus Bacaba*, *Œ. Bataua*, *Œ. distichus*, &c.), the natives of South America are accustomed to prepare a pleasantly-flavoured drink by crushing the fruits in water. Though this, also, is called Palm-wine, it contains no alcohol, if drunk, as it always is, when freshly made; but alcohol can be obtained from similar preparations of many Palm fruits, when they are allowed to ferment. But to indicate the many uses of Palms is impossible in a brief article. In conclusion, it may be mentioned that in the Tamil language of Southern Hindostan a poem exists, called "Tála vilásam," in praise of the Palmyra Palm (*Borassus flabelliformis*); in it 801 uses for this single species are mentioned, and, even to this number, others might easily be added. Those who desire information on this noble order of plants will find Seemann's "Popular History of Palms" serviceable as an introductory work. Martius' large and expensive "Historiæ Palmarum" is still the only comprehensive work on the group; but very great additions to our knowledge have been made since it was published. Bentham and Hooker's "Genera Plantarum" is the best and most recent source of information upon the genera. The Palms of Asia have been written upon by Blume, Griffith, Scheffer, Beccari, and others; those of Australia by Müller, Wendland, and Drude; the few species from Africa by Wendland and Mann; and the American Palms by Pöppig, Humboldt and Bonpland, Martius, Wendland, Grisebach, Wallace, Spruce, Trail, Im Thurm, and others. The most important work of late years on American Palms is one by Drude, in "Flora Brasiliensis," on the Palms of Brazil.

Remarks on Decorative Uses, Culture, &c. The majority of Palms are by no means difficult to cultivate; yet there are a few points relating to their management which require strict attention. All of them need good drainage, and an abundant supply of water in summer; in winter, too, their roots must never approach dryness.

Palmæ—*continued.*

By far the larger proportion are stove plants, and, as such, they need a considerable amount of heat, as well as moisture. One species (*Trachycarpus Fortunei*) is, however, hardy enough to live outside in many favourable localities all the year round; several are available for sub-tropical gardening in summer, and succeed in a warm greenhouse temperature in winter. Many others of a tenderer description may be utilised for conservatory embellishment in summer, if transferred to warmer quarters again in autumn. For exhibition, nothing is of nobler aspect than large specimen Palms; these may be most successfully cultivated in pots, or tubs, small in proportion to the size of plant. As decorative subjects for dinner tables, some of the elegant-habited Palms in a small state are indispensable, particularly the well-known and beautiful *Cocos Weddeliana*, than which nothing better for the purpose exists. Some of the stiffer-growing species withstand confinement in rooms and indifferent treatment remarkably well, even for a long period. Palms represent, therefore, an invaluable class of plants in gardens generally, and a selection of the most useful species is indispensable wherever plant-grouping for effect, and other phases of horticultural decorating, have frequently to be executed.

Propagation. A few Palms may be propagated from suckers where there are established plants from which such may be procured; but the general method of increase is from imported seeds. Some of these germinate in a much shorter time than others, and also grow on faster afterwards. Seeds should be sown thickly in clean, well-drained pans, and covered with about their own depth of soil; this latter should be rendered rather fine, and should consist of about two parts yellow loam and one sharp silver sand. It may be observed that the seedlings must remain, in many instances, a long time in the seed-pans; the kind of soil, and the amount of drainage are, therefore, important considerations. The pans should be plunged in, or placed immediately above, a brisk bottom heat, and kept watered, though not sufficient to cause sourness. Seeds may be sown at almost any season—early spring being that preferred. Many of the slender-growing and more delicate species may have a small portion of peat added to the loam and silver sand, as this sometimes tends to encourage root action quicker and better than when a heavier soil is used.

After-treatment. Palms always succeed better, provided proper attention is given to watering, when they are somewhat restricted at the root, than when over-potted; and this rule is applicable from the very first. When two or three leaves are formed on the seedling plants, they should be placed in the smallest-sized pots that will contain their roots without injury, and be arranged close together in a house where a high temperature and moist atmosphere are maintained. It is important at the first, and also at every subsequent potting, that no part of the stem be buried; the plant's base should merely rest on the surface of the soil, which should be rendered firm throughout by a hand rammer. Roots of Palms should never be cut, if it can possibly be avoided; indeed, with some genera, this practice would be likely to prove most disastrous. Repotting should be conducted according to the rate at which the plants progress: some grow much faster than others. The quantity of roots may be taken as a guide; if these are not more or less crowded, the operation of re-potting may be deferred, as a rule, until they are. Established plants, of any size, should be overhauled in early spring, and any necessary shifting done. If roots are found to have become matted near the base, the old crocks should, if possible, be removed, and soil afterwards substituted. The ball should then be placed intact in another pot, where there is a space of about 2in. all round; this will often suffice for the next two years, at

Palmæ—*continued.*

least. When repotting is unnecessary, a light top-dressing may be given instead. It is essential that the ball should be in a proper condition regarding moisture, at the time of repotting, whether of small or large specimens. In a young state, the smallest shifts are recommended, consistent with the rate of progress made by the plants. In houses of large dimensions, Palms may be planted out; at least, those which are calculated to attain a great height, and are expected to be otherwise proportionately large when developed. For a conservatory, of course, only a few will succeed all the year round; yet these should be utilised for specimens in some part of the beds. The main points in the successful culture of Palms so treated, are much the same as if they were in pots, namely, good drainage and plenty of water. In summer, syringing morning and evening may be freely practised; in winter, the moisture from evaporation, caused by damping the floor and stages, will usually be found sufficient. As Palms have to remain, perhaps, many years in the same soil, it is important that only such as is suitable should be used. Some authorities recommend equal proportions of loam, vegetable mould, peat, and sand, as a general compost. Anything tending to decay, except very slowly indeed, should not be used, as, possibly, it might kill, rather than encourage, the roots. Peat is not altogether a necessity for established Palms; in yellow loam, with plenty of sand, and some charcoal intermixed, they will grow well, and make firmer, yet, perhaps, somewhat slower growth, which is, of the two, more desirable. Manure water is of great assistance to Palms when their roots are somewhat restricted, provided the plants are in good health. It should be made from cow-manure and soot, which imparts a healthy appearance to the leaves. Some information on culture, and references to the uses for which various Palms are best suited, will be found under all the more important genera included in *Palmeæ* throughout this work.

PALMATE. Having five lobes, the midribs of which meet in a common point, so that the whole bears some similarity to the human hand; *e.g.*, the leaf of the common Passion-flower.

PALMATIFID. Cut half-way to the base in a palmate manner. A Palmatifid leaf is shown at Fig. 13.

PALMATILOBED. Cut into shallow divisions in a palmate manner.

PALMATIPARTED, PALMATISECT. Cut nearly to the base in a palmate manner. Almost digitate.

FIG. 13. PALMATIFID LEAF.

PALM, CABBAGE. *See* **Oreodoxa oleracea.**

PALM, DATE. *See* **Phœnix dactylifera.**

PALMETTO, CABBAGE. *See* **Sabal Palmetto.**

PALMETTO, DWARF. *See* **Sabal Adansonii.**

PALMETTO PALM. *See* **Sabal Palmetto.**

PALMETTO, SAW. *See* **Serenoa serrulata.**

PALM, FAN. *See* **Sabal Blackburniana.**

PALMIA (named after L. H. Palm, author of a work on "The Climbing of Plants," published at Stuttgart, in 1827). SYN. *Shutereia.* ORD. *Convolvulaceæ.* A monotypic genus. The species is a beautiful, pubescent, twining herb, inhabiting tropical Asia and Africa. It may be raised from seeds, on a hotbed, in spring, and the young plants, when of sufficient size, should be placed in separate pots, and trained to sticks. Unless a very warm and sheltered position is at command, they require to be placed in the stove or greenhouse to blossom and ripen their seeds. *Hewittia* is now the correct generic name.

Palmia—*continued.*

P. bicolor (two-coloured). *fl.* very white or pale yellowish, with a dark purple centre, one to three on an axillary peduncle; sepals acute, the outer ones much broader; corolla campanulate, with a plicate, five-angled limb; pedicels very short. August. *l.* broadly cordate, entire, angled, or trilobed. 1812. (B. M. 2205 and B. R. 318, under name of *Convolvulus bicolor.*)

PALMISTE ROUGE. *See* **Dictyosperma rubrum.**

PALMITE RUSH. *See* **Prionium Palmita.**

PALM, PATANA. *See* **Œnocarpus Batana.**

PALM SAVANAH. *See* **Sabal mauritiæformis.**

PALM, THATCH. *See* **Sabal Blackburniana.**

PALM-VEINED. Having the main vein radiating from a common point.

PALMYRA-TREE. A common name for *Borassus flabelliformis.*

PALO DE VACA, or **COW-TREE.** *See* **Galactodendron utile.**

PALSY-WORT. An old common name for **Primula veris** (which *see*).

PALTONIUM. Included under **Tænitis** (which *see*).

PALUDOSUS, PALUSTRIS. Growing in marshy places.

PALUMBINA (from *palumbes*, a wood-pigeon; in allusion to the fancied resemblance which the flowers bear to this bird). ORD. *Orchideæ.* A monotypic genus, now included, by Bentham and Hooker, under *Oncidium.* The species is an elegant stove orchid, the flowers of which have been compared to "flying doves." They remain a long time in perfection. For culture, *see* **Oncidium.**

P. candida (white). *fl.* pure white, about 1in. across, of a stout, waxy consistence; lip with a few reddish spots; racemes few-flowered. Summer. *l.* narrow, solitary, 6in. to 12in. long. Pseudo-bulbs, narrow, compressed. Mexico, 1843. SYN. *Oncidium candidum.* (B. M. 5546.)

PAMPAS GRASS. *See* **Gynerium.**

PANÆTIA. Included under **Podolepis** (which *see*).

PANAX (an old Greek name, used by Theophrastus, and akin to *panakes*, a panacea, or remedy, for all complaints; applied to the present plant in reference to the stimulant drug, Ginseng, to which miraculous virtue is ascribed by the Chinese). ORD. *Araliaceæ.* A genus comprising about twenty-five species of stove, greenhouse, or hardy, glabrous, or rarely woolly-tomentose trees or shrubs, natives of tropical and Eastern Asia, extending to Mandchuria, tropical Africa, the Pacific Islands, New Zealand, and Australia. Flowers often polygamous, in small umbels; umbels rarely in contracted heads, or in small, solitary, racemose or paniculate racemes; petals five; pedicels articulated beneath the flowers. Fruit compressed or rarely sub-globose, fleshy, or rarely sub-membranous. Leaves digitately or pinnately compound, or rarely undivided; leaflets entire, argutely toothed or cut. *P. diffusum*, *P. dissectum*, *P. dumosum*, *P. fissum*, *P. laciniatum*, *P. plumatum*, *P. Victoriæ*, and others bearing specific names in gardens, though distinct enough for horticultural purposes, are, in all probability, mere forms of the variable *P. fruticosum.* These plants are of moderately free growth, and the majority are easy to manage. Those requiring stove treatment should be potted in sandy loam and peat, with the addition of a little leaf soil and sand. The stronger-growing kinds thrive in a richer compost. Propagation by cuttings of the roots is a common and successful method. The stems of plants from which the roots have been taken may also be cut into pieces 1in. or 1½in. long, pressed into pots of sand or sandy soil, and plunged in bottom heat. If the stems are cut down without disturbing the roots, and the pots are plunged in bottom heat, and kept moderately

Panax—*continued.*

watered, they will probably throw up several suckers or shoots. These, if taken off with a portion of root to each, will, with a little care, soon make useful plants.

P. armatum (armed). *fl.* numerously produced in umbellules, forming a long, downy panicle. *l.* bipinnate, on long stalks, which are prickly, like the stem; leaflets ovate-acuminate, membranous, serrated, beset on both surfaces with bristly hairs. Stems erect, prickly. India, 1876. A fine-looking, stove shrub. SYN. *Aralia armata.*

P. crassifolium (thick-leaved). A synonym of *Pseudopanax crassifolium.*

P. diffusum (diffuse).* *l.* pale bright green, densely packed towards the apices of the jointed stems, triangular, bipinnate, crispy; primary divisions with linear-oblong, sometimes lobed, always spiny-toothed, bluntish secondary divisions, the teeth turned upwards. *h.* 2ft. South Sea Islands. An ornamental, compact-growing, bushy-habited, stove shrub.

P. dissectum (dissected). *l.* numerous, drooping, bipinnate, having obovate-cuneate leaflets, very greatly varied in size and outline, all furnished with long, marginal teeth. An evergreen stove shrub, of branching habit, very desirable and ornamental.

P. dumosum (bushy).* *l.* bright green, roundish-ovate, pinnately divided, of numerous, variously-shaped lobes, the pinnæ furnished at the margins with incurved, spiny teeth; petioles brownish or olive-green, mottled with brighter green. Stem short-jointed, thickly clothed with leaves. *h.* 6in. to 18in. A very neat and compact-growing stove shrub.

P. elegans (elegant).* *fl.* produced in racemes, which are collected into a large, terminal, branched panicle. *l.* articulate, spreading, and variously divided, pinnate towards the point, with elliptic-oblong, stalked leaflets, while at the basal part they are bipinnate. Queensland, 1880. A pretty and effective, ornamental-leaved shrub (a large and handsome tree in its native habitat), probably hardy in mild districts.

P. fissum (cleft). *l.* tripinnate, the alternate segments linear-lanceolate, with a few incurved, whitish teeth on each margin. Stem erect-branched, flecked with small, elongate, pallid spots, the petioles being of the same colour. South Sea Islands, 1882. An elegant stove shrub.

P. fruticosum (shrubby). *fl.* in terminal, corymbose panicles, with the branches umbelliferous at the apex. *l.* pinnately decompound; leaflets petiolate, oval-oblong, acuminated, coarsely and dentately serrated, ultimate ones deeply trifid. *h.* 6ft. India, Java, &c., 1800. Stove shrub. (A. B. R. 595.)

P. f. Delauana (Delau's). *l.* digitately compound, with divisions ternately or biternately divided; the segments varying from linear-cuneate to obliquely sub-elliptic, irregularly lobed and toothed, green, with whitish-tipped teeth. Polynesia, 1833. An ornamental, dwarf shrub. (I. H. 492.)

P. laciniatum (laciniate).* *l.* tinted, and indistinctly marked with pale olive-brown, bipinnate, nearly as broad as long, drooping; the segments very variable in size and form, presenting the appearance of a complex head of foliage, in which the lanceolate lobes have the preponderancy. South Sea Islands, 1877. An elegant and distinct, stove shrub.

P. longissimum (very long). A synonym of *Pseudopanax crassifolium.*

FIG. 14. PANAX MURRAYI.

P. Murrayi (Murray's). *fl.*, umbels many-flowered, pedunculate, in racemes or divaricately-branched panicles. *l.* simply pinnate, often several feet long; leaflets variable, obliquely lanceolate, entire or variously cut or toothed. Queensland, &c. A splendid tree. See Fig. 14. (B. M. 6978.) SYNS. *P. sessiliflorum* (of Carrière), *Aralia splendidissima* (of gardens). The species to which the name of *sessiliflorum* belongs has trifoliolate leaves, and is a native of Mandchuria.

Panax—*continued.*

P. plumatum (plumed).* *l.* forming a fine, crispy head, very elegantly divided; the leaflets long-stalked and more or less deeply lobed, the edges notched with more or less upcurved teeth. South Sea Islands, 1874. An elegant, small-growing, stove shrub, having the aspect of *P. laciniatum*, but being much more finely cut.

P. quinquefolium (five-leaved). Ginseng. *fl.* yellowish; peduncle of umbel shorter than the petiole. June. *l.* verticillate, petiolate, palmately decompound, the leaflets stalked from the top of the common petiole. *h.* 1½ft. North America, 1740. Hardy, herbaceous. (B. M. 1333.) The proper name of this plant is *Aralia quinquefolia.*

P. sambucifolius (Elder-leaved). *fl.* greenish, small, in umbels, which are collected into racemes, corymbs, or panicles. *fr.* bluish, transparent, attractive. *l.* pinnate, or bipinnate; leaflets elliptic or lanceolate, glaucous beneath. Branches slender. Greenhouse. (B. M. 6093.)

P. sessiliflorum (sessile-flowered), of Carrière. *See* **P. Murrayi.**

P. Victoriæ (Queen Victoria's).* *l.* finely variegated, ternate or almost pinnate, the lateral leaflets forked or trifid, the upper and terminal one larger, simple, ovate, the edge lobed and spinosely toothed, and having the border prettily margined with white. South Pacific Islands. A distinct and graceful, variegated-leaved stove shrub, the leaves forming a dense, plumy, gracefully recurving mass of foliage. (G. C. n. s., xix. 405.)

FIG. 15. PANCRATIUM ILLYRICUM.

PANCRATIUM (from *pan*, all, and *kratys*, potent; in allusion to supposed medicinal qualities). ORD. *Amaryllideæ.* A genus comprising about a dozen species of

Pancratium—*continued.*

stove, greenhouse, or hardy bulbous plants, natives of the West Indies, the Canary Islands, and the Mediterranean region. Flowers white, large, sessile or distinctly pedicellate, many in an umbel, or rarely only one or two; perianth funnel-shaped; tube mediocre, or often elongated into an enlarged throat; lobes narrow, erecto-patent; cup (false corona) frequently produced into two teeth or lobes; involucral bracts two, membranous-scarious. Leaves linear or loriform. Pancratiums are of easy culture, in a compost of two parts good turfy loam, one part peat, and one part decayed leaf soil, to which some silver sand should be added. The indoor species should be placed in a light position; from the end of June until the middle of September they may be kept in a frame or pit. The less shifting and repotting is practised, the better, provided the plants remain healthy. Pancratiums may be grown singly, or three in a pot. When a shift is necessary, all the living roots should be carefully preserved, and any dead ones cut away. Water may be given freely throughout the growing season; when resting, it should be partially withheld, yet not sufficiently to cause flagging. The species grown outside require deep planting, and a protection of some sort in winter. When the plants have once started, their growth cannot well be too rapid, nor the supply of food too liberal. Propagation is effected by seeds, which should be sown in pans of light, sandy soil, in spring, and placed in heat. Water must only be sparingly given until the seedlings appear, and the latter should be potted off when large enough to handle. Propagated also from offsets, which may be collected at potting time. Young bulbs, if carefully grown on, will, in the course of two or three years, make good flowering plants. The only truly hardy species is *P. illyricum*; but *P. maritimum* is hardy enough in mild districts, such as many parts of the West of England. Elsewhere, it is advisable to grow these in a cool greenhouse or frame.

P. Amancæs (Amancaes). A synonym of *Hymenocallis Amancæs.*

P. amboinense (Amboynan). A synonym of *Eurycles amboinensis.*

P. amœnum (charming). A synonym of *Hymenocallis amœna.*

P. australasicum (Australian). A synonym of *Eurycles amboinensis.*

P. calathinum (basket-flowered). A synonym of *Hymenocallis calathina.*

P. carolinianum (Carolinian). A synonym of *P. maritimum.*

P. expansum (expanded). A synonym of *Hymenocallis expansa.*

P. illyricum (Illyrian).* *fl.* fragrant, pedicellate, smaller, and with a shorter tube than in *P. maritimum.* June. *l.* broad, ligulate, deciduous, strongly veined. *h.* 1½ft. South Europe, 1615. An exceedingly attractive plant, quite hardy in most situations. See Fig. 15.

P. littorale (sea-shore). A synonym of *Hymenocallis littoralis.*

FIG. 16. PANCRATIUM MARITIMUM, showing Habit and detached Flower.

P. maritimum (sea).* *fl.* with long, filamentous outer segments, very fragrant, nearly sessile, disposed in large umbels. June. *l.* linear, persistent. *h.* 2ft. South Europe, &c., 1759. Hardy, or nearly so. (B. R. 161.) See Fig. 16. SYN. *P. carolinianum* (B. R. 927).

P. rotatum (rotate). A synonym of *Hymenocallis rotata.*

P. speciosum (showy). A synonym of *Hymenocallis speciosa.*

P. verecundum (ruddy). *fl.* sweet-scented, pedicellate; tube of corolla greenish, 2in. to 3in. long; limb campanulate; segments white inside, green without; scape 1ft. or more long. Summer. *l.* eight to ten, lorate, acute, convolute, channelled, 1½ft. long, ½in. or more broad. Bengal, &c. Stove. (B. R. 413.)

P. zeylanicum (Cingalese). *fl.* solitary; laciniæ longer than the tube, adherent below, revolute above; style longer than the stamens; spathe entire. June. *l.* lorate-lanceolate. Bulb ovate. *h.* 1ft. Ceylon, 1752. Stove. (B. M. 2538; B. R. 479.)

PANDACA. A synonym of **Tabernæmontana** (which *see*).

PANDANEÆ. A natural order of curious, erect or climbing trees or shrubs, di- or tri-chotomously branched, the annulate trunk or branches emitting aërial roots; they are all tropical or sub-tropical, mostly natives of the East African Islands, the Indian Archipelago, and the Pacific Islands; a few are found in the Asiatic and African continents, one in the West Indies, and another in New Zealand. Flowers dicœcious, each sex densely crowded on a simple or compound, axillary or terminal, sessile or pedunculate spadix, accompanied by herbaceous or coloured, persistent or deciduous spathes; males on a branched or thyrsoid spadix with numerous stamens and filaments, with single two- or four-celled anthers; females with one or many-celled ovaries, free, or united in parcels, solitary or numerous ovules, and a sessile stigma. Fruit either woody drupes collected in parcels, or berries; seeds minute, albumen densely fleshy. Leaves clustered, spirally and trifariously disposed, very long-linear and sheathing at base, acuminate, recurved, keeled, concave, rigidly coriaceous, the margins and keel spinulose or serrated, very rarely unarmed, at length totally deciduous; prickles often recurved, or the lower ones recurved and the upper ones incurved. The species, numbering about eighty, have no great economic value; they are classed under two genera: *Freycinetia* and *Pandanus.*

PANDANUS (from *Pandang*, the Malayan name of the genus). Screw Pine. ORD. *Pandaneæ.* A large genus (about eighty species) of stove trees or shrubs, rarely stemless herbs, or with prostrate rooting stems; they are mostly natives of the Malayan Archipelago and the Mascarenes and Seychelles, a few being found in the continents of Asia and Africa, tropical Australia, and Oceania, and in the West Indies. Flowers dicœcious, the males on a clustered, thyrsoid spadix, and the females on a dense, simple one; both are terminal, the females solitary or paniculate, often pendulous during fructescence. Fruit syncarpous, globose, ellipsoid, oblong or cylindrical, often ponderous. Leaves very long or mediocre; floral ones sometimes coloured, spathaceous-bracteate. Trunk slender or robust, rather simple, or with spreading branches. Screw Pines are usually very handsome, and easily cultivated in a stove temperature. They succeed best in sandy loam, with charcoal and some leaf soil intermixed, and they require plenty of water in summer. In winter, they are best kept moderately dry at the root, and no water should be allowed to lodge in the axils of the leaves at that season. The plants always have a disposition to raise themselves out of the pots, in consequence of the direct downward course which the roots invariably pursue. One of the best and most useful species is *P. Veitchii*; it is largely employed, in a young state, for table decoration, for which purpose offsets should be procured so soon as they are large enough to be detached. This species, and several others, form handsome decorative or exhibition subjects in comparatively small pots. Propagated principally from offsets, which should be carefully detached from the base with the point of a sharp knife, and inserted singly in small pots. The crown of each cutting

Pandanus—*continued.*

must be kept well up, the pots should be plunged in a close propagating frame, and but little water should be given until roots are formed. Propagated also from

FIG. 17. PANDANUS CANDELABRUM VARIEGATUS.

seeds, and from suckers. The species of this genus are remarkable for their aërial roots, with large, cup-like root-caps. They are of variable size, but usually form large bushes about 10ft. to 15ft. high.

P. Blancoi (Blanc's). A synonym of *P. odoratissimus.*

P. Candelabrum. Candelabrum or Chandelier Tree. *l.* about 3ft. long and 2in. wide, dark green, armed at the edges with brown spines. Guinea, 1826. This species, in its native habitat, "forms a magnificent branching tree, attaining a height of

Pandanus—*continued.*

30ft. or even more, and sending down large roots, which look like stems, and secure them in their positions."

P. C. variegatus (variegated).* *l.* narrow, from 3ft. to 6ft. or more in length, slightly pendulous, armed with white spines on the edges, and reversed ones at the back of the midrib; ground colour bright green, with bands of pure white extending from base to apex. Java, 1875. A plant of great beauty. SYN. *P. javanicus variegatus.* See Fig. 17.

P. Candelabrum (candelabra-formed), of Bot. Mag. A synonym of *P. utilis.*

P. caricosus (Carex-like). *fl.* yellowish-white; inflorescence erect, terminal, dense, about 8in. long by 2½in. thick; bracts the same colour as the flowers. *l.* narrow, channelled, glaucous, not very spiny. Moluccas, 1879. Shrub of rather dwarf habit, branching at base. (R. H. 1878, 84.)

P. ceramensis (Island of Ceram). A synonym of *P. conoideus.*

P. conoideus (conoid).* *l.* forming a neat, spreading tuft, dark green, elegantly arched, of moderate length, carinate, spiny on the margin, and on the two secondary ridges of the upper surface, while the keel is smooth. New Caledonia, &c., 1872. A small, freely-branching tree, about 14ft. high. SYNS. *P. ceramensis, P. decorus.*

P. decorus (becoming). A synonym of *P. conoideus.*

P. elegantissimus (very elegant). A synonym of *P. utilis.*

P. flabelliformis (flabellate). A synonym of *P. utilis.*

P. fœtidus (stinking). *fl.*, partial racemes or thyrses of the male flower simple. *fr.* wedge-shaped, angular, single. *l.* as in *P. odoratissimus*, but smaller. India, 1842. Plant usually in the form of a thick, impenetrable bush, 5ft. to 6ft. high.

P. furcatus (forked). *l.* bright green, broadish, very much acuminated, armed both on the margins and on the keel with sharp spines, the lower of which are curved, and those near the point straight, greenish at first, and becoming brown as they mature. India and Indian Archipelago, 1824. A very handsome tree, somewhat rare in cultivation. The specific name, *furcatus*, alludes to the little forked spine with which the drupes are crowned. SYN. *P. Lais.* See Fig. 18.

P. glaucescens (glaucescent).* *l.* spreading, glaucous, and densely packed, armed with white spines, and terminated by a long point. 1865. India. An elegant, herbaceous plant.

P. graminifolius (grass-leaved). *l.* 12in. to 18in. long, three to four lines wide; margins densely, and rib beneath sparingly, spinulose; spines minute, straight. *h.* 2ft. Tenasserim. A pretty, dwarf-growing shrub, very useful for table decoration, &c.

FIG. 18. PANDANUS FURCATUS (much reduced).

P. graminifolius (grass-leaved), of gardens. A garden name for a species of *Freycinetia.*

Pandanus—*continued.*

P. heterocarpus (variable-fruited).* *l.* broad, from 3ft. to 6ft., or even more, in length, of a dark shining green above, lighter or somewhat glaucous beneath, armed at the margins and the back of the midrib with short, white spines. Philippines, 1866. A very handsome and ornamental species. SYN. *P. ornatus*, of gardens.

P. Hornei (Horn's). A synonym of *P. Houlletii.*

FIG. 19. PANDANUS HOULLETII.

P. Houlletii (Houllet's).* *l.* from 4ft. to 5ft. long, 3in. wide, carinate, spinescent on the margin and keel, contracted rather suddenly at the summit into a triangular, cuspidate point, 6in. to 8in. long, and of a greenish-red above and deep coppery beneath. Singapore, 1868. An elegant species. SYN. *P. Hornei.* See Fig. 19. (R. H. 1868, 210.)

P. javanicus variegatus (Javanese variegated). A synonym of *P. Candelabrum variegatus.*

P. Lais (Lais). A synonym of *P. furcatus.*

P. mauritianus (Mauritian). A synonym of *P. utilis.*

P. minor (lesser).* *fr.* sub-erect, as large as the fist, composed of about 150 yellow drupes; drupes with a hemispherical top, terminated by a short, brownish, claw-like spine. *l.* sub-distichous, 1½ft. to 2ft. long, gracefully recurving, keeled, the margins spinulose. Stems slender, about 3ft. long, prostrate. Bengal, 1878. (B. M. 6347, under name of *P. unguifer.*)

P. odoratissimus (very odorous).* *fr.*, drupes 2in. long, seventy to ninety in an oblong-elliptical, drooping head, 6in. to 10in. long. *l.* in drooping tufts, terminating the short branches, bright green, 3ft. to 5ft. long, armed with short, white spines.

Pandanus—*continued.*

FIG. 20. PANDANUS ODORATISSIMUS.

h. 20ft. Tropical Asia. A slender tree. The specific name is owing to the odour exhaled by the male inflorescence; a scent, much esteemed in Java, &c., is obtained from it. SYN. *P. Blancoi.* See Fig. 20.

P. odoratissimus (very odorous). A garden synonym of *P. utilis.*

P. ornatus (adorned). A garden synonym of *P. heterocarpus.*

FIG. 21. PANDANUS UTILIS.

Pandanus—*continued.*

P. Pancheri (Pancher's).* *l.* linear, 3ft. to 5ft. long and about 2in. broad; margins spinose-toothed, carinate beneath; the lower half of the carina reddish, and strongly spinose-toothed. New Caledonia, 1878. SYN. *Barrotia Pancheri.* (L. H. 288.)

P. polycephalus (many-headed). *l.* long, narrow, glaucous, spreading in elegant curves, and furnished at the head and keel with spines, the former pointing backwards, the latter forwards. Philippine Islands, 1866. A graceful perennial, of rather dwarf habit. SYN. *P. Porteanus.*

P. Porteanus (Porte's). A synonym of *P. polycephalus.*

P. pygmæus (pigmy). *fl.* on a short, erect peduncle, buried among the upper leaves. *l.* at the extremities of the branches, about 1ft. long, spirally arranged in threes, from an amplexicaul, broad base, linear-subulate, the margins and keel fringed with white, spinulose serratures. Madagascar. A low-spreading shrub, not 2ft. high in the centre, but from the base sending out numerous branches in all directions. (B. M. 4736.)

P. reflexus (reflexed). *l.* pendulous, or bent back, from 4ft. to 6ft. long, dark shining green, armed with long, white spines on the edges, and reversed ones on the under side of the midrib. India, 1818.

P. utilis (useful).* *fr.* in long, trigono-globose, long-peduncled, pendulous heads, about 6in. in diameter, containing 100 drupes about 1½in. long. *l.* glaucous, erect, 1ft. to 2¾ft. long, armed with sharp red spines. *h.* (in its native place) 60ft. Madagascar. See Fig. 21. (I. H. 1860, 265.) SYNS. *P. Candelabrum* (B. M. 5014), *P. elegantissimus*, *P. flabelliformis* (R. H. 1866, 271,), *P. mauritianus* (I. H. 1860, 265,), *P. odoratissimus* (of gardens).

P. Vandermeeschii (Vandermeesch's).* *fr.* in trigono-globose heads, containing over 100 fusiform drupes, 1in. long; peduncle often red. *l.* stiff, sub erect, 2½ft. to 3ft. long, 1½in. to 2in. broad, very glaucous, the thickened, red margins armed with strong, red, pungent spines; midrib red, prominent, also spiny. Stem light in colour, 5in. to 6in. in diameter. *h.* 20ft. Mauritius. Tree.

P. Veitchii (Veitch's).* *l.* broad, 2ft. long, somewhat pendulous, spiny, of a dark green in the centre, and bordered with broad bands of pure white. Polynesia, 1868. A very beautiful plant. (R. G. 1872, 310.)

PANDOREA. Included under **Tecoma** (which *see*).

PANDURATE, or **PANDURIFORM.** Fiddle-shaped; obovate in form, with one or two deep recesses

FIG. 22. PANDURATE LEAF.

or indentations on each side. A Pandurate leaf is shown at Fig. 22.

PANGIACEÆ. Included under *Bixineæ.*

PANICLE. An inflorescence having the axis divided into branches bearing two or more flowers.

PANICUM (the old Latin name, derived by Pliny from *paniculum*, a panicle; alluding to the usual form of inflorescence). Panick-Grass. SYN. *Thalasium.* ORD. *Gramineæ.* An extensive genus of stove, greenhouse, or hardy, annual or perennial grasses, of variable habit, chiefly natives of tropical and sub-tropical regions of the globe. Nearly 800 supposed species have been described, but the total number fairly distinct as such can scarcely be estimated at much above 250 (Bentham). Many supposed genera, amongst which are *Digitaria* and *Echinochloa*, have been at times separated from *Panicum*, but these are now united by the authors of the "Genera Plantarum." Spikelets ovate, acuminate or obtuse, rarely globose, articulated with the pedicels, loosely or densely paniculate, or in undivided spikes with a terminal hermaphrodite flower, and usually a lower male one; glumes usually four, much shorter than the spikelets, in a few species evanescent; stamens (? always) three; style distinct, or shortly connate at base; stigma feathery. Several members of this genus are of economic value, but few are found in gardens. Two species—*P. Crus-galli* and *P. glabrum*—are British. The under-mentioned are hardy, except where otherwise stated, and thrive in any moderately good garden soil. Propagated by seeds.

Panicum—*continued.*

P. altissimum (very tall). *fl.*, panicle large, 1ft. to 1½ft. long, all the branches whorled, simple, racemiform, naked below. *l.* 1ft. to 1¼ft. long, lanceolate-linear, acuminate, glabrous. *h.* 6ft. to 30ft. West Indies, &c. Plant woody, arborescent.

FIG. 23. PANICUM CAPILLARE, showing—(1) Habit, (2) Spikelet, (3) Spikelet, with outer Palea removed, (4) Ovary, with long Style and Plumose Stigmas.

P. capillare (hair-panicled).* *fl.*, panicles large, pyramidal, produced in great profusion, and borne both at the ends of the stems and in the axils of the stem-leaves. Summer. *h.* 1½ft. to 2ft. Europe, Asia, North America, 1758. A pretty annual. See Fig. 23.

P. colonum (colonial). *fl.*, spikelets four to six-seriate, very shortly pedicellate, scabrous-pubescent; sterile glumes mucronate, the lowest short, the two superior equalling or shortly exceeding the fertile flower; spikes ½in. to 1in. long. *l.* linear, acuminate, glabrous. *h.* 1ft. to 1½ft. West Indies, &c. Half-hardy annual.

P. italicum (Italian). *fl.* in a panicle, about 1in. in diameter; cylindrical, at length nodding at the summit; spikelets elliptical-oblong. *l.* broad. Branches contiguous with, or a little distant below, the panicle, ovate or oblong. *h.* 2ft. to 4ft. West Indies. A tall annual, now naturalised in many European and other countries.

P. maximum (largest). *fl.*, spikelets elliptic-oblong, glabrous; lowest glume short, the two upper ones little exceeding the fertile flower; panicle 1in. to 1½in. long, the lower branches whorled, usually bearing a few bristles. *l.* linear or lanceolate, acuminate, ciliated at the base and ligule; nodes usually villous. *h.* 5ft. to 10ft. West Indies, &c. A stout, stove perennial.

FIG. 24. PANICUM MILIACEUM, showing—(1) Habit, (2) Spikelet, (3) Inner Palea, (4) Ovary, with long Style and Branched Stigmas, (5) Stigma, and (6) Grain.

P. miliaceum (Millet-like).* Little Millet. *fl.* in a much-divided, nodding panicle; spikelets numerous, pedicellate, ovoid. *l.* rather broad, hairy. *h.* 2ft. An erect annual, cultivated in the Mediterranean region. See Fig. 24.

Panicum—*continued.*

P. plicatum niveo-vittatum (plaited, snowy-striped).* *l.* finely banded with longitudinal stripes of pure white, broad-plaited. 1868. A prettily marked, strong-growing, garden variety, thriving in the stove or greenhouse. (F. d. S. 1743-4.)

P. spectabile (remarkable). Caapim de Angola. *fl.*, spikes numerous, the superior ones exceeding their internodes; spikelets four to six-seriate. *l.* long, lanceolate, acuminate, glabrescent. Jamaica, Brazil, &c.

P. variegatum (variegated).* *l.* white-striped and pink-tinted, lanceolate, with gracefully-waved margins. Tropical Asia, &c., 1867. An elegant little greenhouse variegated perennial, extremely pretty when grown in a basket. It should be kept in heat during winter. Propagated freely from cuttings. The correct name of this plant is *Oplismenus Burmanni variegatus.*

FIG. 25. PANICUM VIRGATUM.

P. virgatum (twiggy).* *fl.*, panicle branches at first erect or ascending, afterwards extensively spreading or drooping. Summer. *l.* linear, flat, very long. *h.* 3ft. to 5ft. North America, 1781. A very ornamental perennial species, growing in large, handsome tufts. See Fig. 25.

PANNOSE. Resembling coarse cloth in texture or appearance.

PANSY (*Viola tricolor*). Under the name of Heartsease, and several other popular designations, this plant has long been grown in gardens, where its flowers have been amongst those most generally favoured by rich and poor alike. This can scarcely be wondered at, considering the ease with which Pansies may be grown by almost anyone, the wonderful diversity in colour and marking which the different flowers exhibit, and the ornamental and floriferous habit the plants assume. Even those who are not sufficiently interested in Pansies to grow a collection of named varieties, may procure a packet of mixed seeds, and raise any quantity of plants, that will scarcely be less ornamental for the hardy flower garden or mixed border.

Propagation. Pansies are readily multiplied by seeds, cuttings, and, sometimes, by layers. Seeds may be sown at almost any time of year; but, as planting out is best performed in spring or early autumn, it is advisable to sow with a view to preparing plants for these two seasons—namely, in June for transplanting in autumn, and in August or September, for spring. The seeds should be sown in pans of light soil, covered slightly, and placed in a very gentle heat, or in a cold frame. They soon germinate, and the seedlings, when large enough to handle, should be pricked out in an unheated frame, or in boxes. Before planting outside, it is important that good roots be formed, and that balls of soil should adhere to them; on this condition, much of the after-success depends. Pansy cuttings strike readily towards the latter part of summer, in cold frames, or in a cool, shady border, such as that alongside a wall or hedge, facing north. Side-shoots are to be preferred for cuttings; they may frequently be procured from the base with roots already formed. The soil should be of a sandy nature, and it should be pressed firmly around the cuttings at the time of inserting. Plants so obtained may be placed in their permanent quarters in autumn, or in a prepared border, with a view to lifting them again with better roots and with balls of soil. Layering may be recommended for increasing good varieties that produce but few base shoots; and division of the old plants, in August and September, is, in some instances, a profitable method, because such a quantity of rooted plants may be obtained. Where a large stock of Pansies has to be kept up, it will be necessary to keep inserting cuttings all through the season.

Pansy—*continued.*

Cultivation. Pansies, for ordinary garden decoration, will thrive in almost any soil, without special treatment, provided the position is neither too hot nor too dry. It is principally on account of their preference for a cool, moist bottom that the plants succeed so much better, generally, in the northern parts of Britain than in the southern. If good culture and generous treatment are accorded by the special preparation of beds for, at least, all the choicer varieties, flowers of greater size and substance may be obtained, and the flowering season may also be considerably prolonged thereby. This becomes well-nigh a necessity, if exhibiting is attempted, as only large flowers with all their qualities properly developed are of any use. Fibry loam, thoroughly decomposed cow-manure, or horse droppings, and some sharp sand or road grit, should be used for digging in with the ordinary soil, which it is essential should also be of a good depth. A mulching of old potting soil, leaf mould, and other manure may be given as a top-dressing, so soon as the flowering season begins, and again later on. Such mulchings have a wonderful effect in dry, hot weather by keeping the ground cool, and, to a great extent, preventing evaporation. Deep planting is also recommended, as it places the roots in a much cooler and more moist medium than if they were near the surface. A position neither too much exposed to the mid-day sun, nor over-shadowed by trees, should, if possible, be selected for growing Pansies, when fine flowers are desired. When a southern aspect is, for some reason, unavoidable, a light shading of tiffany is sometimes employed for a few hours each hot day along the sunny side. Strong plants for early flowering, placed in their permanent quarters in September, should be protected, in case of severe weather, with some light litter. Spring planting should be attended to as early as weather permits, say, the end of February, or early in March, in order that the roots may become the better established before hot weather arrives. When watering is necessary in summer, a good soaking should be given, and this only in the evening. Slight waterings are frequently more injurious than beneficial. If flowers for exhibition are required, only about four or six main shoots should be allowed each plant; others being pinched off occasionally as they are formed. All blossoms may also be removed until about three weeks before a show; this tends to strengthen the plants, and increase the size of their flowers.

Culture in Pots. Where this method of growing Pansies is adopted, strong plants should be inserted in 4in. pots early in October, and be placed in a cold frame, with a south aspect. Plenty of air and light are essential. During mild weather, the sashes should be removed: when it is frosty, coverings are preferable to artificial heat. In February, the plants should be transferred into 7in. or 8in. pots, using plenty of drainage, and a rich, open soil. By keeping the shoots tied out, and the flower-buds pinched off, good plants soon develop. From April onwards, frames with a northern aspect would be better, on account of being cooler.

Varieties. Of these the number may almost be said to be legion, so great a variation in colour and markings do the plants represent. See Fig. 26. There are two sections

Pansy—*continued.*

into which Pansies are divided, namely, Fancy and Show. Varieties of the latter are further sub-divided, according to the colour of their flowers, into three classes, termed respectively Selfs, White Grounds, and Yellow Grounds. The Selfs are either black, maroon, primrose, white, or yellow. White Grounds have a large, central, dark blotch round the eye, then a ring, either of white or cream-colour, and an outer band of bronze, purple, or maroon. Fancy, or Belgian, Pansies have various colours and tints curiously blended in their different flowers, the petals being blotched, flamed, and edged, and quite distinct from those of the Show section. A third section is sometimes made on behalf of Bedding varieties. These are usually self-coloured, and are distinguished by their compact and floriferous habit, and, as a rule, rather small flowers. They are more the offspring of *V. cornuta* and

FIG. 26. PANSY (*Viola tricolor*).

V. lutea than of the Pansy, *V. tricolor*, and are more generally known as Violas. The line of demarcation, however, between a Viola and a Pansy is now practically undefinable. Subjoined is a list, which comprises varieties of Fancy and Show Pansies of excellent quality in every respect; some new ones of 1885 are denoted by daggers (†). For a selection of floriferous Bedding varieties, *see* **Viola.**

Fancy Pansies.

ALEXANDER GRANT,† dense brown blotches; upper petals bright yellow, margined and flaked crimson. ALEX. KIRK, yellow, with mulberry blotches on all the petals. ALEX. M'COMB, violet blotches; upper petals and margins claret; distinct and fine. BEAUTY,† dark rosy-crimson blotch; side and upper petals laced with white; fine form. CAMPBELL-BANNERMAN, white, purple blotches; upper petals purple-edged; fine. CAPTAIN HOUSTOUN, mulberry blotches; upper petals crimson; large. CATHERINE AGNES, purple, edged white. COLINSBURGH,† yellow, dense maroon blotches; extra. COLONEL WELSH, mulberry blotches; upper petals violet, primrose margin; fine form. DAVID FINDLAY, dark violet blotches; upper petals claret, primrose margin. EFFIE WELSH, violet blotches on all the petals, white margin. EVELYN BRUCE, blotches mulberry; upper petals yellow, with crimson margins; extra. JAMES GRIEVE,† yellow, flaked with red, dense, dark blotches; large; extra good. JOHN GOLD, pale crimson, dense, black blotches. MAGGIE COCHRAN,† blotches bluish-purple, edged white; upper petals white, rayed rosy-purple; extra. MARTHA M'INTOSH,† dense blue blotches; upper petals puce, edged white; fine eye. MAY FERGUSON,† blotches dark blue; upper petals white, flaked purple, edged pure white. MAY TATE, yellow, shaded red. MISS BLISS, yellow self, dense blotches; extra. MRS. DALGETY, upper petals and blotches violet, white lacing. MRS. G. P. FRAME, dark blotches, shaded crimson, white lacing. MRS. HUTT, yellow self, dense mulberry blotches; extra. MRS. M. H. MILLER, upper petals flamed carmine, edged gold. MRS. T. M'COMB, mulberry blotches; upper petals purple; extra. MRS. W. D. BLACK,† rich maroon blotch; upper and side petals shaded rosy-purple, edged with white. MRS. WELSH, very dark violet self, pure white margin; extra fine. MRS. WM. M. WELSH, violet blotch, edged carmine; distinct. PERFECTION, mulberry blotch; upper petals violet. PILRIG,† mulberry blotches; fine eye; upper petals yellow, margined with crimson. PLORA GEM, dense, dark blotches, clear white margin round all the petals. ROYAL QUEEN, deep orange,

Pansy—*continued.*

edged rosy-purple; one of the largest fancies. SUNBEAM, light cream self, with solid blue blotches; fine. T. M'COMB, rich crimson; extra. WM. CUTHBERTSON, yellow, shaded crimson. WM. DICK,† dense maroon blotches, fine eye, margined with golden yellow. WM. HOWIE†, dense maroon blotches; upper petals flaked crimson and orange, golden-yellow edge; extra fine.

Show Pansies.

Class I. Selfs.—A. FOX, dark and smooth. BLACK PRINCE, very dark; fine form. COUNTESS OF ROSEBERY,† primrose, dark blotch and eye; extra fine. DR. GRAY, azure-blue, dense blotch, distinct. GOMAR, deep yellow; fine. ISA CRAIG, primrose, dense blotch. ISA SMITH, cream; very smooth. JAMES SKINNER,† rich mulberry, fine eye; one of the best of its class. JANEY ANDERSON, white, large. JOHN DONALDSON, velvety-maroon. LEITH WALK BEAUTY, dark mulberry. MRS. DOBBIE, white, smooth. MRS. GOODALL, white, dense blotch. MRS. TOM SMITH,† pure white, large; fine for competition. PARAGON,† rich yellow, fine blotch; extra. PILRIG GEM, maroon. PRIMROSE GEM,† primrose, dense solid blotch, fine eye; distinct and constant. ROBERT BLACK, black; extra. W. J. CLARK, white, solid blotch; good substance.

Class II. White Grounds. DEVONIA, purple belt. JANE GRIEVE, purple belt; extra fine. JESSIE FOOTE, purple belt. JOHN CLARK, dark purple blotch and belt; fine exhibition flower. LIZZIE DONALDSON,† large, white circular field, fine dark purple belt; extra fine. M. H. MILLER, violet-purple belt, solid blotch; fine. MISS KATE SUTHERLAND, dark purple belt; fine show flower. MRS. A. PEEBLES, violet-purple belt, large; of fine form. MRS. GLADSTONE, rich purple belt; fine form. MRS. J. BUSH,† white, solid purple belt; fine form and substance. MRS. R. LAIDLAW, purple belt. MRS. TODD, cream, dark purple belt. N. H. POWNALL, purple belt; extra. THE MEDE, broad purple belt.

Class III. Yellow Grounds. ALEX. SMITH,† medium shade of yellow, dark purple belt; good form and substance. CHANCELLOR, gold, maroon belt. DR. ROBERTSON, yellow, maroon belt. ELLA MURRAY, yellow, bronze belt. JAMES COOK, golden-yellow ground, yellow-ruby belt; extra. J. B. DOWNIE, bronze belt. LORD F. CAVENDISH, deep golden-yellow ground, rich bronzy-purple margins; flowers very large. MARY M'COMB, maroon belt. PILRIG KING, mulberry blotch, reddish-bronze belt; fine. R. DONALDSON, maroon belt; fine. ROBERT BURNS, lemon, chocolate belt; large, constant. T. M'COMB, purple belt; large.

PAPAVER (the old Latin name, used by Pliny, &c.). Poppy. ORD. *Papaveraceæ.* A genus comprising about fourteen species of hardy or half-hardy, hispid or glaucous, annual or perennial herbs, with milky juice; one is South African, another extra-tropical Australian, and the rest are found in the temperate or sub-tropical regions of Asia, North Africa, and Europe; four are truly natives of Britain, and a fifth—the Opium Poppy—is naturalised here and there. Flowers red, violet, yellow, or white, showy; sepals two, rarely three; petals four, rarely six; stamens many; peduncles elongated; flower-buds nodding. Leaves usually lobed or dissected. The cultivation of this genus is very simple, the most suitable soil being a sandy loam. The species and varieties are admirable subjects for borders, and for naturalising in woody spots. Propagation is freely effected by seeds, or by divisions. All the plants described below are hardy.

P. alpinum (alpine).* *fl.* yellow, rose-tinted, or white; sepals covered with long, adpressed hairs. Summer. *l.* hispid or glabrous, once or twice pinnatisect, with narrow, sub-linear or elliptic lobes; hairs spreading or adpressed. *h.* 6in. From a botanical point of view, this and *P. nudicaule* are really but one species; in cultivation, however, *P. alpinum* is a dwarfer, more slender plant, and has, generally, citron-yellow flowers.

P. bracteatum (bracteate).* *fl.* red, bracteate; sepals scabrous. May. *l.* or bracts pinnati-partite, hispid; lobes oblong, serrated, deeply incised. *h.* 4ft. Caucasus, 1817. Strictly speaking, this is only a marked variety of *P. orientale.* See Fig. 27. (B. M. 658; L. C. B. 23.)

P. Hookeri (Hooker's).* *fl.* varying from pale rose to crimson-scarlet, with a diffused white or blue-black blotch at the base; stigmatic rays twelve to twenty. Autumn. India, 1884. An ornamental plant, resembling *P. Rhœas* in general aspect, but forming a large bushy herb 3ft. to 4ft. high. (B. M. 6729.)

P. horridum (horrid). *fl.* brick or red-colour; sepals hispid. July. *l.* sub-amplexicaul, glaucous, sinuato-pinnatifid, the lobules prickly at the apices and on the nerves. Stem few-flowered, with rigid prickles, very hispid. *h.* 2ft. Australia and South Africa, 1825. (S. B. F. G. 173; B. M. 3623, under name of *P. gariepinum.*)

P. lateritium (brick-red). *fl.* bright orange, about 2in. across, with obovate petals, and sepals covered on the back with long yellow hairs. May. *l.* linear-elliptical, pinnatifid at the base; those of the root densely crowded together, 6in. to 12in. long,

Papaver—*continued.*

and ½in. or more broad; the lower segments much divided, the upper ones few and coarsely serrated; stem leaves much smaller and nearly sessile. *h.* 1½ft. to 2ft. Armenia.

P. nudicaule (naked-stemmed).* *fl.* bright orange, yellow, or white, large and very showy, with nearly orbicular petals, and rather pilose sepals. Summer. *l.* pinnate, glaucous; segments finely cut into acute lobes. *h.* 9in. to 18in. Mountains of Northern hemisphere, 1759. A beautiful alpine perennial. (S. B. F. G. 247.)

P. n. croceum (golden). *fl.* orange-yellow or saffron, large and showy, with the petals slightly waved at the margin. Summer. *l.* erect, glaucous underneath, delicate green on the upper side, rough, with spreading hairs. *h.* 8in. to 15in. Siberia, 1829. A pretty perennial, resembling *Meconopsis cambrica* in habit. (B. M. 2344, under name of *P. croceum.*)

FIG. 27. PAPAVER BRACTEATUM.

P. orientale (Eastern).* *fl.* deep scarlet, usually with a dark purple spot at the base of each petal, 6in. or more across; sepals three. Early summer. *l.* pinnate, about 1ft. long, clothed with white bristly hairs. Stem rough and leafy. *h.* 2ft. to 3ft. Armenia, 1714. A well-known plant, and one of the showiest of hardy perennials. (B. M. 57.) There are several more or less distinct varieties, including *concolor*, which has no spots at the base of the petals; and *triumphans*, a very floriferous and dwarfer habited form.

P. pavonium (peacock-like). *fl.* scarlet, with a black horseshoe-shaped blotch at the base of each petal; ovary and capsule setose. Summer. *l.* rather small, bipinnatifid. Central Asia, 1883. (R. G. 1095, f. 3-4.)

Papaver—*continued.*

P. persicum (Persian). *fl.* brick-red; sepals setose. June. *l.* pinnatifid, setose; segments almost undivided, often aristate. Stems leafy, paniculate. *h.* 1½ft. Persia, 1830. (B. R. 1570.)

P. pilosum (pilose).* *fl.* pale lurid scarlet, or intense orange, with a white mark at the bottom of each petal. Stem many-flowered, with spreading hairs. Summer. *l.* stem-clasping, cut, pilose on both surfaces. *h.* 1ft. to 2ft. Bithynia and Mount Olympus. Plant about the size of *P. somniferum*, but pale green, not glaucous. A very showy perennial. (B. M. 4749, under name of *P. nudicaule.*)

FIG. 28. PAPAVER RHŒAS FLORE-PLENO.

P. Rhœas (common field).* Common Corn Poppy, Redweed, Wind Rose, &c. *fl.* brilliant scarlet, large. Stem many-flowered, scabrous, with spreading bristles. Summer. *l.* pinnate-parted, the lobes elongated and deeply toothed, acute. *h.* 1ft. Europe (Britain), North Africa, West Asia. (Sy. En. B. 58.) This well-known annual has produced innumerable varieties under cultivation, both double (see Fig. 28) and single. The garden strains, respectively known as the Carnation, Picotee, and Ranunculus-flowered Poppies, are double forms of this species.

FIG. 29. PAPAVER DANEBROG.

P. R. umbrosum (shaded).* *fl.* of a dazzling scarlet, with a jet-black blotch on the inner base of each petal, which is sometimes margined with ashy-grey; scapes long, one-flowered. Summer. *h.* 2ft. Caucasus, 1877. (G. C. n. s., xxii. 49.)

Papaver—*continued.*

P. setigerum (bristly). *fl.* violet; capsule obovate, not stipitate. Summer. A near ally of the Opium Poppy, but differing from it in having the teeth of the leaves terminating in a stiff bristle, and in the simple or slightly branched stem ending in two or three elongated peduncles, which, as well as the leaves, are hairy. *h.* 1ft. to 2ft. Europe, Asia. (S. B. F. G. 172.) Of this Poppy, numerous fine strains have originated in gardens.

FIG. 30. PAPAVER MURSELLI.

P. somniferum (sleep-causing).* Opium Poppy. *fl.* variously coloured, white, rose, lilac, violet, often striped, and usually with a darker spot at the base of the petals, the latter fringed in some varieties. Stem many-flowered, smooth. July. *l.* oblong-amplexicaul, sinuate, glaucous, broad, waved, lobed, cordate at the base. *h.* 3ft. to 4ft. Europe, Asia, West Africa, India, and naturalised in many parts of this country. Annual. (B. M. Pl. 18). Opium is the inspissated milky juice of this species, obtained by making incisions in the capsule. The seeds are destitute of narcotic quality, and may be eaten; they are sold as birds' food, under the name of Maw Seed. The name *pæoniæflorum* is given in gardens to a select strain of this species with very double, Pæony-like flowers. What is grown in gardens under the name of Danebrog Poppy (see Fig. 29), is also a strain of this species. *P. Mursellii* is another garden strain, with double flowers and fringed petals (see Fig. 30).

PAPAVERACEÆ. A natural order of glabrous and often glaucescent, or long-pilose, herbs, or very rarely small shrubs, mostly inhabiting the temperate, cold, and sub-tropical regions of the Northern hemisphere, only a few being found within the tropics or in the Southern hemisphere. Flowers hermaphrodite, regular or (in *Fumarieæ*) irregular; sepals two or three, rarely four, free, imbricated, very caducous; petals four or six, rarely eight or twelve, free, in two, or rarely three, series, imbricated and frequently corrugated, deciduous; stamens hypogynous, free, or the filaments connate; peduncles one-flowered, or very rarely sub-umbellately many-flowered, usually elongated, terminal or in the upper axils. Fruit a capsule. Leaves alternate, or the floral ones occasionally sub-opposite, entire, or often lobed or dissected, exstipulate. Many of the species contain coloured juices. The most important product, however, is opium, prepared from the milky juice of *Papaver somniferum*; this species is also cultivated in France for its seeds, which yield what is known as white oil or oleum. The order comprises twenty-five genera and about 160 species. Well-known examples are: *Eschscholtzia*, *Fumaria*, *Papaver*, and *Platystemon*.

PAPAW-TREE. *See* **Carica Papaya.**

PAPAYA. Included under *Carica.*

PAPAYACEÆ. A tribe of *Passifloreæ.*

PAPER MULBERRY. *See* **Broussonetia papyrifera.**

PAPER REED OR RUSH. *See* **Papyrus antiquorum.**

PAPER-TREE. *See* **Streblus asper.**

PAPHINIA. Included under **Lycaste** (which *see*).

PAPILIONACEÆ. A sub-order of *Leguminosæ*, spread over the whole world, but principally inhabiting the North temperate hemisphere. There are some 295 genera, and about 4700 species. All the British, and, with two exceptions, all the European, members of *Leguminosæ* belong to this sub-order. For the chief botanical characteristics, *see* **Leguminosæ.**

FIG. 31. PAPILIONACEOUS COROLLA.

PAPILIONACEOUS. Having a corolla similar to that of the Pea. See Fig. 31.

PAPILIONIDÆ. A family of Butterflies, some species of which are injurious to cultivated plants. The family marks are: that the perfect insects are moderately large, the wings spreading from 1½in. to 4in. across, and all six legs are useful for walking; the larvæ are long, nearly cylindrical, and naked, or only slightly hairy; and the pupæ are fixed to supports by both a belt of silk round the middle and a silk cord at the tail. The family includes eleven British species, and among these are the largest British butterfly, viz., the Swallow-tail, which lives in the Fen Counties of England, feeding on Umbellifers. Other well-known species are the Brimstone Butterfly, the Clouded Yellows, the Orange Tip, and the various White Butterflies. These last alone are hurtful in gardens. The larvæ of the Large White (*Pieris Brassicæ*) and the Small White (*P. Rapæ*) do great injury to Cabbages (*see* **Cabbage Caterpillars**), and those of the Black-veined White (*Aporia Cratægi*) feed on Hawthorn, and on Apple and Pear-trees (*see* **Hawthorn Caterpillars**).

PAPILLÆ, or PAPULÆ. Soft, oblong, superficial glands.

PAPPUS. A term applied to various hairy tufts on achenes or fruits; or to the mere rim, scales, or hairs, to which the calyx is reduced in *Compositæ.*

PAPULÆ. *See* **Papillæ.**

PAPYRACEOUS. Of the consistency of writing-paper.

PAPYRIA. A synonym of *Gethyllis.*

PAPYRUS (from *Papuros*, an old Greek name, of Egyptian origin, used by Theophrastus). ORD. *Cyperaceæ.* A small genus of sedges, mostly stove aquatic perennials, natives of tropical and warm regions, included, by Bentham and Hooker, under *Cyperus.* Inflorescence in many-flowered spikelets, surrounded by long bracts; glumes imbricated, in two rows, one-flowered. The only species requiring mention here is *P. antiquorum.* It is usually cultivated as an aquatic, but may be grown in a pot of rich, heavy loam, if kept standing in a pan or tub of water. For sub-tropical gardening, it is a very useful subject, and is best grown in shallow water, in a warm position. It should be removed indoors early in the month of September. Propagated by divisions of the rhizome.

P. antiquorum (ancient).* Egyptian Paper Reed or Rush. Stems dark green, triangular, jointless, supporting, at the top, an umbel of pendent leaves, which impart a very graceful and striking appearance. *h.* 10ft. Egypt, 1803. "The pith-like

Papyrus—*continued.*

tissues of the larger flowering-stems, cut into thin strips, united together by narrowly-overlapping margins, and then crossed, under pressure, by a similar arrangement of strips at right angles, constituted the papyrus of antiquity" (Oliver). The proper name of this plant is *Cyperus Papyrus.*

PARACARYUM (from *para*, beside, and *karyon*, a nut; in reference to the position of the nutlets). SYN. *Omphalodes* (in part). ORD. *Boragineæ.* A genus comprising about ten species of mostly hardy, biennial or perennial, cano-pubescent, hirsute, or rarely setose-hispid herbs, natives of South Europe and Central Asia. Flowers violet or blue, rather small, pedicellate or sub-sessile; calyx five-parted or deeply five-cut; corolla funnel-shaped, with a short or rather long tube, and five imbricated, obtuse, short, erect or spreading lobes; racemes elongated, ebracteate, or few-bracted at base, sometimes loose and broadly paniculate. Nutlets four, depressed at back. Leaves alternate. The species best known in gardens are those described below, for culture of which *see* **Cynoglossum.**

P. anchusoides (Anchusa-like). *fl.*, corolla tube purplish, cylindrical, the limb blue, sub-patent; pedicels extra-axillary, shorter than the calyx; panicles loosely branched, elongated, naked at apex. May. *l.*, radical ones lanceolate, long-stalked; cauline ones linear-lanceolate, sessile. *h.* 2ft. Cashmere, 1840. (B. R. 1842, 14, under name of *Cynoglossum anchusoides.*)

P. cœlestinum (celestial-blue). *fl.*, corolla blue, margined with white; fructiferous pedicels reflexed, shorter than the calyx; racemes ebracteate, often twice bifid. August. *l.*, radical ones petiolate, cordate-ovate, sub-acute; cauline ones ovate, acute, cuneate at base. *h.* 1ft. to 2ft. North India, 1837. (B. R. 1839, 36, under name of *Cynoglossum cœlestinum.*)

P. myosotoides (Myosotis-like). *fl.* loosely racemose; corolla blue, small, funnel-shaped, scarcely longer than the calyx. September. *l.*, radical ones spathulate-lanceolate; cauline ones sessile, linear-lanceolate, strigose, rough. *h.* 1½ft. Orient, 1838. Half-hardy.

PARADISANTHUS (from *Paradeisos*, park, Paradise, and *anthos*, a flower; in reference to the beauty of the plant). ORD. *Orchideæ.* A small genus, of uncertain affinity. Flowers white, curiously striped with deep purple; sepals oblong-lanceolate, acute, the two lateral ones slightly unequal at the base; lip shortly clawed, often pendulous; pollen masses four, depressed, pyriform. Leaves lanceolate, acute, green, sub-glaucous, twin. *P. bahiensis* and *P. Mosenii* are little, terrestrial, stemless orchids, rarely cultivated in England. *P. Mosenii* should be grown, suspended near the glass, in an intermediate house, and potted in a mixture of peat, sphagnum, and charcoal. During winter, very little water is required.

P. Mosenii (Dr. Mosen's). *fl.*, peduncle longer than the leaves; sepals green, with a few brown bars; lips white, with mauve stripes in the basilar hollow, having angles beneath; anterior part of the column purple. *l.* oblong, acute, grass-like. Pseudobulbs oblong, compressed 2in. long. Brazil, 1881.

PARADISE, GRAINS OF. A common name applied to the seeds of *Amomum Melegueta.*

PARADISIA (from *Paradeisos*, Paradise, of which the flower is supposed to be a suitable inhabitant). SYNS. *Allobrogia, Czackia, Hyperogyne, Liliastrum.* ORD. *Liliaceæ.* A monotypic genus. The species is a hardy, perennial herb, with a very short rhizome, and rather thick, fasciculate root-fibres. For culture, *see* **Anthericum.**

P. Liliastrum (Liliaster). This is the correct name of the plant described and figured in this work under name of *Anthericum Liliastrum.*

PARAGRAMMA. Included under **Polypodium** (which *see*).

PARAGUAY TEA. *See* **Ilex paraguariensis.**

PARANEPHELIUS. Included under **Liabum** (which *see*).

PARANOMUS. A synonym of **Nivenia** (which *see*).

PARAPETALIFERA. A synonym of *Barosma.*

PARASITIC. Growing into some other plant, and deriving its food from the juices of that plant.

PARASOL, CHINESE. *See* **Sterculia platanifolia.**

PARASOL FIR. *See* **Sciadopitys verticillata.**

PARASOL PINE. *See* **Pinus Pinea.**

PARASTRANTHUS. Included under *Lobelia.*

PARATROPIA. A synonym of **Heptapleurum** (which *see*).

PARCHMENT BARK. *See* **Pittosporum crassifolium.**

PARDANTHUS (from *pardos*, a leopard, and *anthos*, a flower; referring to the spotted flowers). ORD. *Irideæ.* A monotypic genus. The species is a hardy, tuberous-rooted, herbaceous perennial; it requires a rich, sandy-loam soil, and a sheltered situation in winter. Propagated, in spring, by seeds or by divisions.

FIG. 32. INFLORESCENCE AND LEAF OF PARDANTHUS CHINENSIS.

P. chinensis (Chinese). *fl.* orange-coloured, spotted with purple-brown, nearly 2in. across; perianth segments equal, spreading, narrowed at the base; tube very short. June. *l.* equitant, ensiform. Stem erect, leafy. *h.* 1½ft. to 2ft. China and Japan, 1823. See Fig. 32. (F. d. S. 1632; B. M. 171, under name of *Ixia chinensis.*) The genus *Pardanthus* is synonymous with *Belamcanda*, and the proper name of the plant here described is *B. chinensis.*

PARDUYNA. A synonym of **Schelhammera** (which *see*).

PARECHITES. A synonym of **Trachelospermum** (which *see*).

PAREIRA BRAVA. A name applied to *Chondrodendron tomentosum.*

PARIETES. The inside walls of any organ.

PARINARIUM (from *Parinari*, the native name of the plant in Brazil). SYNS. *Balantium, Exitelia, Lepidocarya, Maranthes, Petrocarya.* ORD. *Rosaceæ.* A genus comprising about thirty-three species of stove shrubs or trees, often tall, natives of the Indian Archipelago, North Australia, the Pacific Islands, tropical Africa, Brazil, and Guiana; one has been discovered in the Trinity Islands, and another in South Africa. Flowers white or pink, paniculate or racemosely corymbose, bibracteolate, hermaphrodite; calyx with a short or elongated tube, and five sub-equal, imbricated lobes; petals five, rarely four, inserted at the mouth of the calyx, sessile or unguiculate, deciduous. Fruit ovoid or spherical, sometimes edible. Leaves alternate, persistent, very frequently thick and coriaceous, eglandulose or biglandulose at the apex, entire; stipules subulate or lanceolate. Few of the species are known to cultivation. For culture of those described below, *see* **Chrysobalanus.**

P. excelsum (tall). Guinea Plum. *fl.* white, in panicled racemes. February. *fr.* about the size of "Impératrice" plums, with a coarse skin of a greyish colour; the pulp is dry and farinaceous, and, owing to the size of the stone, is small in bulk. *l.* oblong, coriaceous, deep green above, white with

Parinarium—*continued.*

pubescence beneath. Guinea, 1822. A large tree. This species is the "Grey" or "Rough-skinned Plum" of Sierra Leone.

P. macrophyllum (large-leaved). Gingerbread Plum. *fl.* white, in terminal racemes. February. *fr.* oblong, twice the size of that of the preceding species, which it much resembles in flavour and appearance. *l.* large, ovate, sessile, and cordate, green above and downy beneath. Stems thickly beset with brown hairs. Guinea, 1822. Shrub or small tree.

PARI-PINNATE. Even-pinnate; abruptly pinnate.

PARIS (from *par*, equal; alluding to the regularity of the parts). ORD. *Liliaceæ*. Of this genus, about half-a-dozen species have been proposed; but not more than three or four are sufficiently distinct for that rank. They are hardy perennial herbs, with creeping rhizomes, natives of Europe and temperate and mountainous Asia. Flowers green, erect, solitary, pedicellate; perianth persistent, with distinct segments in series of four to six. Leaves four or many, whorled at the apex of the stem, sessile or petiolate, lanceolate or ovate, slenderly three-nerved and reticulate-venulose. Stem simple. *P. polyphylla* and *P. quadrifolia* are the only species which call for description here. The leaves and stems of the latter were formerly employed in medicine, and the juice of the berry has been used to cure inflammation of the eyes. They thrive in light sandy loam, in a shaded situation. Propagated by divisons, or by seeds.

P. polyphylla (many-leaved). *fl.* pedicellate; sepals greenish, four to six, leafy, ovate-lanceolate; petals yellow, four to six, filiform; stamens four to ten. May. *fr.* brilliant scarlet. *l.* four to nine in a whorl, petiolate, linear or oblong-lanceolate, acuminate, rounded or acute at base. *h.* 3in. to 2½ft. Himalayas, 1826. (I. H. Pl. 24.)

P. quadrifolia (four-leaved). Herb-Paris; True Love. *fl.*, perianth yellowish-green, the four outer segments about 1in. long, the four inner ones rather more yellow; peduncle rising to 1in. or 2in. above the leaves. Spring or early summer. *fr.* bluish-black. *l.* four, broadly ovate or obovate, 2in. to 4in. long. Stem 9in. to 12in. high. Europe (Britain), Russian Asia, &c. "Sometimes, but rarely, there is a fifth leaf, with the addition of a fifth to each of the parts of the flower" (Bentham). (Sy. En. B. 1509.)

PARITIUM. Included under **Hibiscus** (which *see*).

PARK. An extensive inclosure of land, specially set apart for public or private recreation and enjoyment. In and around cities and large towns, public Parks, or similar open spaces; are essential for promoting health as well as for affording recreation. A private Park usually surrounds the owner's residence, and, in consequence, should be rendered as attractive as possible. Its beauty depends very materially on the natural landscape and disposition of land, although much may be accomplished, by way of improving Park scenery, by persons competent to conduct alterations. An irregular belt of trees, such as succeed best in the soil and locality, is always most satisfactory as a boundary, and all the material for forming the principal groups and masses in the Park should be similarly selected with a due regard to the description of soil. For instance, Chestnut, Elm, Oak, and Lime-trees are best suited with loam or clay soils; while Beech, Birch, and Sycamore may be cited as trees which succeed in poor soils and in exposed situations. Bold groups of trees, circular or oval in general outline, and composed of one species or variety, are to be recommended, and single specimens of a marked and distinct character may be judiciously introduced in well-chosen spots; not, however, with a too frequent repetition. In any system of arrangement, formality must be avoided; and the idea of producing a natural picturesque effect, where it is wanting, should be the aim kept in view. In planning and laying out Parks, and in improving Park scenery, much experience and judgment are necessary with each case individually. No two are exactly alike. The subject is one of an indefinite extent, and is far too vast for dealing with in such a limited space as that which is here available.

PARKERIA PTEROIDES. *See* **Ceratopteris thalictroides.**

PARKIA (named in honour of Mungo Park, 1771-1805, the celebrated African traveller). SYN. *Parryphosphæra*. ORD. *Leguminosæ*. This genus comprises about eight species of showy, unarmed, stove trees, two or three of which inhabit tropical Asia and Africa, and four or five tropical America. Flowers very numerous, in large heads; upper ones yellowish, tawny, or red; lower ones sterile, white or red; peduncles sometimes solitary, axillary, very long, pendulous, sometimes several at the apices of the branches. Leaves bipinnate; leaflets small, numerous, and in pairs. The species best known in gardens are *P. africana* and *P. biglandulosa*. For culture, *see* **Inga.**

P. africana. African Locust, or Nitta-tree. *fl.* crimson, in biglobular heads. February. *l.* with usually twenty pairs of pinnæ, each pinna bearing about thirty pairs of obtuse, pubescent leaflets, with a gland at the base of the petiole, and with a small, umbilicate gland between two or three of the upper pairs of leaflets. *h.* 30ft. to 40ft. Africa, 1822. An agreeable beverage is prepared from the sweet, farinaceous pulp surrounding the seeds, and sweetmeats are also made of it.

P. biglandulosa (biglandular). *fl.*, upper ones brownish-yellow or red, lower sterile ones whitish; calyx ⅓in. long, the tube glabrous, the teeth pilose. Immature pod downy. *l.*, rachis downy, 1ft. or more long; pinnæ forty to sixty, 3in. to 4in. long; leaflets linear-ligulate, 150 to 200 to a pinna; petioles biglandular. Malay Peninsula.

PARKINSONIA (named after John Parkinson, 1567-1629, an apothecary of London, author of "Paradisis Terrestris," and "Theatrum Botanicum"). ORD. *Leguminosæ*. A genus comprising only three species of stove or greenhouse trees, of which one is Mexican, the second South African, and the third broadly dispersed over the warmer parts of Western America and the Antilles. Flowers disposed in short, loose, axillary racemes; calyx segments five, narrow, imbricate or sub-valvate; petals five, spreading. Pods linear, torulose. Leaves at first sight apparently simply pinnate and fasciculate, but really bipinnate; common petiole very short, spine-like; pinnæ two to four, very long; leaflets numerous, small; stipules often short, spinescent. *P. aculeata*, the only species in cultivation, is an ornamental, stove, evergreen plant, of great beauty, but very difficult to preserve. It is generally raised from imported seeds. The young plants should be potted in a well-drained, porous loam, and kept in a light, airy place.

P. aculeata (prickly). Jerusalem Thorn. *fl.* yellow, sweet-scented, disposed in loose, pendulous racemes. *l.* bipinnate; leaflets usually deciduous or abortive; petioles linear, very long, winged. *h.* 8ft. to 10ft. Tropical America, 1739; cultivated in all tropical countries. Plant furnished with generally solitary, straight prickles or spines. Stove.

PARMENTIERA (named after A. Parmentier, 1737-1813, a French writer on edible plants). ORD. *Bignoniaceæ*. A genus comprising about three species of glabrous, stove trees, inhabiting Mexico and Central America. Flowers greenish, large, at the nodes, solitary or few, pedicellate; corolla tube short above the base, incurved at the throat, ample, campanulate; limb subbilabiate. Fruit edible, elongate-fusiform or oblong. Leaves alternate or almost opposite, solitary or fasciculate at the nodes, trifoliolate, or in some cases simple; common petiole often winged. *P. cereifera*, the only species introduced, requires culture similar to **Bignonia** (which *see*).

P. cereifera (wax-bearing). Candle-tree. *fl.* white, large; lobes of corolla emarginate. *fr.* from 2ft. to 3ft. long, waxy-yellow, hanging down, and much resembling large candles; hence the common name. *l.* all trifoliolate; leaflets ovate-elliptic or obovate-oblong, acuminated at each end, serrated or entire; common petiole winged. Panama, 1866.

PARNASSIA (named from Mount Parnassus; called Grass of Parnassus by Dioscorides). Grass of Parnassus. ORD. *Saxifrageæ*. A genus comprising about twelve species of elegant, hardy, glabrous, erect, perennial herbs, often marsh-loving, inhabiting the temperate and frigid regions of the Northern hemisphere and the mountains of the whole of India. Flowers white or pale yellow, rather large; calyx tube short or very short,

Parnassia—*continued.*

free or adnate at the base to the ovary; lobes five, spreading, imbricate; petals five, spreading, marcescent, entire or fimbriate; scape angular, one-flowered. Leaves radical, petiolate, ovate-reniform or oblong; petioles dilated at base. Parnassias succeed in a moist, peaty soil or spongy bog. Propagated by divisions, or by seeds.

P. asarifolia (Asarum-leaved). *fl.* white; petals five, abruptly contracted into a claw at the base. Summer. *l.*, radical ones kidney-shaped; cauline ones somewhat cordate-orbicular. *h.* 6in. North America, 1812. An extremely pretty plant, with larger leaves and flowers than the British species.

P. caroliniana (Carolinian). *fl.* white, netted with green or purple, and having a greenish tint; petals almost sessile. July. *l.*, radical ones somewhat orbicular, cauline ones ovate, sessile. *h.* 6in. North America (in swamps), 1802. (B. M. 1459; R. G. 824.)

P. fimbriata (fringed). *fl.* white; petals obovate, unguiculate, fringed at the base. July. *l.*, radical ones kidney-shaped, cucullate at the base; cauline ones cordate. *h.* 6in. North America. The leaves of this species are remarkably hollowed out at the base close to the lateral ribs, which are connected with one another by a common base, like the divisions of a pedate leaf, and have, consequently, a very elegant appearance.

P. nubicola (cloud-inhabiting). *fl.* white, solitary, 1in. to 1½in. in diameter; staminodes yellow, three-lobed; peduncle four-angled, 6in. to 12in. high. Summer. *l.*, radical ones petiolate, elliptic, sub-cordate; cauline ones solitary, sessile, elliptic. Himalayas, 1882. (B. M. 6609.)

P. palustris (marsh-loving). Common Grass of Parnassus. *fl.* white, marked with greenish, pellucid veins; petals almost sessile, somewhat emarginate. Summer. *l.*, radical ones cordate, cauline ones stem-clasping. *h.* 6in. Northern hemisphere (Britain). An elegant bog plant. (Sy. En. B. 565.)

P. parviflora (small-flowered). *fl.* white, with pale purple or green netted veins; petals sessile. July and August. *l.*, radical ones ovate, cauline ones sessile. *h.* 6in. North America, 1820.

PARNASSUS, GRASS OF. *See* **Parnassia palustris.**

PAROCHETUS (from *para*, near, and *ochetus*, a brook; referring to the habitat of the genus). ORD. *Leguminosæ.* A monotypic genus. The species is an elegant, hardy, prostrate, herbaceous plant; it is most desirable for the rock garden, and for choice borders in warm positions, and in light vegetable soil. Propagated by divisions, or by seeds.

P. communis (common). Shamrock Pea. *fl.* of a beautiful blue, rather large, having a slightly acute keel; disposed on solitary or axillary peduncles, or in umbels of two or three. *l.* digitately trifoliolate, and resembling those of the Shamrock; leaflets truncate, dentately-serrated. *h.* 2in. to 3in. 1820. Cold and temperate Himalayas, &c. (F. d. S. 1575.)

PARONYCHIA (old Greek name used by Dioscorides, and derived from *paronychia*, a whitlow, for which it was thought to be a cure). Nailwort; Whitlow Grass. ORD. *Illecebraceæ.* A genus of about forty species of small, annual or perennial, mostly hardy herbs, often cæspitose, natives of the Mediterranean region, North Africa, Arabia, America, and Angola. Flowers small, in cymose heads or fascicles, often hidden by the large, white, scarious bracts; perianth five-parted. Leaves opposite, oblong-lanceolate or subulate, flat, or very rarely with recurved margins, entire; stipules usually large, scarious, shining. Thé Arabe, or Algerian Tea (*Paronychia argentea*, Lam., and *P. nivea*, DC.), is used in catarrh, phthisis, and to promote digestion. Scarcely any of the species are worth growing, except, perhaps, the following. They thrive in a light, sandy soil. Propagated by seeds; the perennials also by divisions.

P. argentea (silvery). *fl.* whitish, axillary and terminal, crowded; bracts white and shining, acuminate. *l.* ovate, slightly glabrous, sub-acute; stipules broader, but shorter, than the leaves. South Europe, 1869. A free-growing and very dwarf plant, forming neat, compact patches 1ft. or more in diameter. The large, silvery stipules, and the numerous, scarious bracts of the same colour, have a good effect.

P. serpyllifolia (Thyme-leaved). *fl.* in dense heads at the tips of the shoots, surrounded and completely hidden by silvery, scarious bracts. Summer. *l.* sub-orbicular or obovate, ciliate. Stems prostrate. South Europe. This makes a pretty covering for beds, or amongst taller-growing plants, and is much used in carpet-bedding.

PARONYCHIEÆ. A tribe of *Illecebraceæ.*

PARROT-BEAK PLANT. *See* **Clianthus.**

PARROTIA (named after F. Parrot, 1792-1812, a German naturalist and traveller). ORD. *Hamamelideæ.* This genus comprises a couple of species of hardy trees or shrubs, the one inhabiting Kashmir, the other Northern Persia. Calyx-tube bell-shaped, and the border divided into five or seven lobes; corolla wanting; stamens five to seven; styles two. Leaves oblong or orbicular, deciduous, crenate; stipules large, deciduous. *P. persica*, under cultivation, is a beautiful, hardy shrub or small tree, whose chief attraction lies in the fine autumnal tints of its leaves. The most suitable situation for it is against a wall, where it will need no protection, and almost any soil will suit it. Both species may be propagated by seeds, or by layers.

P. Jacquemontiana (Jacquemont's). *fl.* small; calyx segments narrow, oblong or linear; involucral bracts obovate, ¾in. long. *l.* 2in. to 3in. in diameter, blunt; petioles ¼in. long. *h.* 6ft. to 12ft. Kashmir. A gregarious bush, closely resembling a hazel. (B. F. F. 28.)

P. persica (Persian).* Iron-tree. *fl.* chiefly conspicuous for the numerous, spreading stamens. *l.* ovate-oblong, of a deep green in summer; in autumn, they assume at the tip a glowing crimson colour, in the centre a rich orange or yellow, while the base retains its green hue. *h.* 10ft. Persia, 1848. (B. M. 5744.)

PARROT'S BILL. *See* **Clianthus puniceus.**

PARRYA (named after Captain W. E. Parry, 1790-1855, the Arctic navigator). Including *Neuroloma* and *Pachyneurum*. ORD. *Cruciferæ.* A genus comprising half-a-score species of hardy, low, glabrous or pilose herbs, with thick perennial roots, all Arctic, or natives of the highest mountains of Northern Asia. Flowers white, rose, or purple, racemose, rarely on solitary scapes, usually showy; sepals erect; petals unguiculate, spathulate; scape naked or leafy. Pod compressed. Leaves linear or spathulate, entire or sinuate-toothed, in one species pinnatifid. Parryas thrive in any garden soil. Increased by division.

P. arabidiflorum (Arabis-flowered). *fl.* purple; petals obovate; pedicels scarcely longer than the calyx; scapes simple. May. *l.* sub-radical, somewhat fleshy, lanceolate. *h.* 6in. Siberia, 1800. SYNS. *Hesperis arabidiflora*, *Neuroloma arabidiflora.*

P. arctica (Arctic). *fl.* pale purple, borne in corymbs; anthers oval; peduncles quite smooth. May and June. *l.* almost all quite entire. *h.* 3in. Arctic America, 1820.

P. integerrima (entire-leaved). *fl.* beautiful purple, about the size of those of *Cardamine pratensis*; racemes at first corymbose. April and May. *l.*, radical ones rather spathulate, quite entire; cauline ones few. *h.* 6in. Siberia, 1827.

P. nudicaulis (naked-stemmed). *fl.* lilac, 1in. across, six to eight in a corymb on a leafless stem; petals obcordate. Early summer. *l.* all radical, petiolate, elliptic-oblong, acute, entire or toothed, 2in. to 3in. long. Arctic regions, 1883. A beautiful little rock-work plant.

PARSLEY (*Carum Petroselinum*). A hardy biennial, said to have been introduced into this country from Sardinia in 1548; it has become naturalised in some localities. Hooker, in the "Student's Flora," asserts that it is "only known as a cultivated plant or an escape," but De Candolle, in his "Origine des Plantes Cultivées," believes it to be truly wild in the Mediterranean region. The leaves are in great demand for garnishing, and also for flavouring in numerous culinary preparations. Parsley, for one or both of these purposes, is in daily request throughout the whole year, and the crop is, in consequence, a most important one, a continued supply being maintained only by devoting considerable attention and forethought to its culture. In some gardens, Parsley will, from some unaccountable cause, very rarely succeed; and in others, where it usually grows freely, it is not uncommon to find a sowing, or a whole crop, suddenly die away without, apparently, any satisfactory reason. This causes much inconvenience, and should be prevented, if possible, by sowing somewhat frequently, so that, in the event of a failure occurring, a supply from the succession may soon be forthcoming.

Parsley—*continued.*

Cultivation. A partially shaded position in the best part of the garden should be selected for Parsley. It is too often relegated to an unfavourable spot, or used as an edging to walks—situations in which it sometimes, yet but seldom, bears produce such as may be secured under more liberal treatment. A good soil, of considerable depth, and not too light, suits Parsley best. A thick coating of manure should be dug in previous to sowing, unless the soil is sufficiently rich without. Borders with a western or an eastern aspect may be utilised for the summer supplies, while that intended for winter should be sown in a sheltered position, with southern exposure, such, for instance, as the foot of a south wall. To maintain a continuous supply, it is advisable to sow at three different times: first, in February, as early as circumstances and the weather permit; secondly, in April or early in May; and thirdly, in July—this last being specially intended for winter. Sometimes the first spring sowing is sufficient, but it should not be solely depended upon where a large quantity is required. The seed should always be sown thinly in drills from 12in. to 15in. apart, and about 1in. deep. It is invariably a long time germinating; four or five weeks is not at all unusual. It is advantageous to fill in the drills with sandy soil at the first sowing, as this assists germination. Thinning of the young plants must be commenced when they are of sufficient size, allowing first a distance of 3in., and eventually about 6in. space for each. By this method, much larger leaves, of good substance, are obtained than when thinning is not practised, or only insufficient space is allowed between the rows. Should many of the leaves in summer become old, and turn yellow, in consequence of there being an unlimited supply, it is a good plan to cut over about half, or one-third, of the stock, and allow the crowns to grow afresh. Afterwards, the other part might be similarly treated if it were thought requisite. It is generally necessary to protect Parsley in winter, either by frames, hand-glasses, or other methods, as, although the plants are hardy, their leaves are not sufficiently so to withstand much frost; and these form the part in daily request. It is a good plan to prepare plants in a convenient part of a south border, with a view to placing spare or temporary frames and sashes over them before winter. Additional coverings of mats, or whatever may be available, are requisite in frosty weather. For small supplies, a few plants may be inserted thickly in pots or boxes, at intervals, and placed in any cool house or pit, or on a mild hotbed.

Transplanting Parsley may be recommended, particularly in unfavourable districts, and for the first spring-sown plants. For this purpose, the seeds should be sown thinly, in February, in a similar way to Carrots, &c., on a prepared hotbed, and the pit or frame should be ventilated, and otherwise treated in much the same manner. About the end of April, or early in May, the seedlings must be hardened off, and carefully transplanted about 6in. apart, in a warm border. The strong tap-root should be preserved, if possible, by gently handling the plants when removing them to their new quarters. If a supply has failed, some plants may be retained and made to produce leaves of a usable size much quicker by growing them on in frames or boxes, in a warm temperature, instead of placing all outside. Thus treated, a much earlier crop may be secured than if the seeds were sown outside in the usual way. Transplanting may also be practised, at the latter part of summer, for the winter crop, when it is intended to use frames for protecting plants in the ground in the manner already alluded to. From 6in. to 8in. each way would be sufficient space; such an even disposition of plants could scarcely be secured by another method.

If it is intended to raise seeds of the varieties of

Parsley—*continued.*

Curled Parsley, some established plants, having the most perfectly curled leaves, should be selected for that purpose, and transplanted in an open spot by themselves, in early spring. The seed ripens in quantity about July, and, after being dried, will retain its vegetative properties for from two to three years.

Sorts. Of the curled-leaved varieties of Parsley that are most valuable for ordinary use, and more especially for garnishing, those of a compact habit, and with close, perfectly curled leaves, are to be preferred. The common sort bears coarse leaves, but is of a somewhat hardier nature than those of which the leaves are curled; the latter are, however, far superior in every way. The following are amongst the best sorts in cultivation: COVENT GARDEN GARNISHING, beautifully curled leaves, of first-rate quality. FERN-LEAVED, a distinct variety, with close-crested leaves; fine for garnishing. MYATT'S GARNISHING, strong-growing, beautifully curled; an excellent sort, very extensively cultivated. VEITCH'S SPLENDID CURLED, a very excellent and select stock, with beautifully curled leaves.

Hamburgh, or Turnip-rooted, Parsley is a variety grown only for the use of its fleshy roots, which are cooked and eaten like Parsnips. Seeds may be sown in February or March, in drills, 1ft. apart. The plants should, in due course, be thinned, and lifted when full grown, about October, when they may be stored in sand until required for use.

Neapolitan, or Celery-leaved, Parsley may here be referred to, as it is sometimes grown for the use of the leaf-stalks, which are blanched and eaten like those of Celery. The seeds should be sown in March, the seedlings being afterwards transplanted into shallow trenches, 2ft. apart, and treated like Celery, except that they must not be so freely watered.

PARSLEY FERN. *See* **Cryptogramme.**

PARSLEY FERN, MOUNTAIN. *See* **Cryptogramme.**

PARSNIP (*Peucedanum sativum*). A hardy biennial, a native of Europe (Britain) and Siberia. It has been cultivated since the time of the Romans for its roots, which are eaten as a vegetable, and used for various purposes, not the least being that of the preparation of an excellent wine. Parsnips are very nutritious, but not so much so as Potatoes, a vegetable for which they have been recommended as a substitute. Potatoes are also more productive, and their flavour far more generally liked, than Parsnips; still, the latter are much esteemed, and form a portion of the crops in almost every kitchen and also cottage garden, whether large or small. In the Channel Islands, this vegetable is successfully cultivated, the soil there being peculiarly adapted to its requirements. The roots are in greater request, at certain seasons, in Roman Catholic countries than in others.

Cultivation. Parsnips succeed best in an open situation, where the soil is not too stiff, yet is rich, and of a good depth. A somewhat sandy loam is most suitable, and it is best if tolerably free from stones, which tend to divert the roots from a straight downward course. Land in preparation, and intended for the vegetable under notice, should be deeply trenched the previous autumn, and manure added then, if necessary—its addition in spring invariably results in the production of forked, instead of straight, roots. Ridges of soil left for the winter should be levelled down in February, or very early in March, and the seed sown thinly, yet regularly, in shallow drills, 18in. or 20in. apart. Before the young plants become drawn, they should be thinned, partially at first, and finally, in due course, to distances of 12in. or 15in. apart, according to the size they are likely to attain. An occasional hoeing will be all that is necessary until the leaves die in autumn, when the roots will

Parsnip—*continued.*

be fit for use, and a stock may be lifted and stored in a cool shed, for that purpose being covered with sand or light soil. Parsnips are, however, much better if dug from the ground as required for use; consequently, only enough should be stored inside for maintaining a supply in frosty weather up till February, or until growth recommences, when the whole stock must be dug up. A Parsnip, with a portion of its leaves removed, is represented in Fig. 33.

FIG. 33. PARSNIP.

Seed Saving. Parsnip seed does not satisfactorily retain its germinative powers longer than one year. If seed is to be raised, a few of the best roots should be carefully planted in a sheltered position early in the year. The seed will ripen in quantity during the latter part of summer, when it may be dried and stored in the ordinary way.

Sorts. These are not numerous. The following are the best: HOLLOW-CROWNED, large, heavy, and of excellent quality; best for general use. LARGE GUERNSEY, roots large, long, and tapering; a variety extensively cultivated in the Channel Islands. THE STUDENT, medium size, of superior flavour and good quality.

There is a variety called Turnip-rooted, because of its roots resembling Turnips in shape and growing principally above ground. It is not much cultivated, but has been recommended for shallow soils, on which the other sorts do not properly succeed.

Pests. The Parsnip is occasionally liable to the attacks of Fungi, of which, probably, the worst are *Erisyphe Martii* and *Peronospora nivea*; but the crop seldom suffers much from these causes. Means of prevention and of remedy will be found under the headings **Mildew, Oidium,** and **Peronospora** (which *see*).

Parsnip—*continued.*

The insects that most frequently injure Parsnips also affect various allied plants, notably the Carrot, and they will be found mentioned under the following headings: **Carrot Blossom Moth** (*Depressaria daucella* or *D. nervosa*), **Carrot Grubs** (*Psila Rosæ*), **Celery Fly** (*Tephritis Onopordinis*), **Flat-body Moth** (*Depressaria applana* or *D. cicutella*), **Parsnip-Seed Moth** (*D. Heracleana*), and **Purple Carrot-Seed Moth** (*D. depressella*). Their appearance, habits, and modes of doing damage, and the best remedies against each, will be found in detail under these heads, but may be summarised here as follows:

Psila Rosæ is a small, two-winged fly, the grubs of which are slender, white or yellowish, and about ¼in. long. They burrow into the tap-roots of Parsnips and of Carrots, forming narrow, irregular galleries. The diseased plants show the injury by the outer leaves drooping and turning yellow. It has been found useful, as a remedy, to water the plants with solutions of paraffin (one ounce to one gallon of water) or of alum, or liquid manure; and gas-lime, soot, or sand prepared with tar (one gallon to a barrowful of sand), are all useful applications if dug into the soil.

Tephritis Onopordinis is harmful, inasmuch as the grubs burrow between the surfaces of the leaves of Parsnips, producing large, pale patches, in which the surfaces are separated from each other. These patches are useless for the nutrition of the plant; hence, when numerous, much injury is done to the leaves. One or more grubs are present in each patch. When full-fed, they generally bore through the skin of the leaf, and into the soil, and in it they turn into brown, oval pupæ; but sometimes they become pupæ in the discoloured patches of the leaves. From the pupæ, in a fortnight or so in summer, or after the winter, emerge brown or yellowish two-winged flies, about the size of house flies, with brown-spotted wings and green eyes. The best remedy is to crush the spots, when they are small, between the finger and thumb, or pick off and burn the diseased leaves. The leaves may also be sprinkled with lime, or gas-lime, or soot, to prevent deposition of the eggs. The pupæ may be destroyed by digging gas-lime into the soil in autumn and winter, or by paring off and burning 3in. or 4in. of the surface soil.

All the moths that need be noticed here belong to the genus *Depressaria*, a rather large group of insects, included in the **Tineina** (which *see* for characters). They vary from a little over ½in. to 1in. across the wings. The fore wings are cut square at the tips, and the hind margin of the hind wings is generally notched near the base. The insects are usually grey, reddish-brown, or brown, and the fore wings bear darker spots or streaks. Several of these moths live on umbelliferous plants, in the umbels of flowers, or in pieces of the leaves so rolled as to form tubes. The parts occupied by them are spun together by means of silk, and thus afford them protection from enemies of every kind. When the web is torn, or even if the plant is shaken, the larvæ wriggle to the exterior, and drop to the ground, to re-ascend at leisure. When full-fed, they usually bore into stems of the food-plant, and in them become pupæ. In this state they frequently hibernate, though some live through the winter as moths. Those larvæ that feed on the leaves do comparatively little harm, but those that feed in the umbel eat the flowers and fruits, and do much mischief to the seed crop. The best remedy is hand-picking, or shaking the affected umbels. The larvæ readily fall out, and should be trampled upon and crushed before they can crawl away, or again reach the umbels.

PARSNIP FLY. *See* **Tephritis Onopordinis,** under PARSNIP PESTS.

PARSNIP-SEED MOTH (*Depressaria Heracleana*). A small moth, belonging to a genus which includes about forty British species. It is one of the large group *Tineina*, a group characterised chiefly by the long fringes of the wings, which are, in most of them, long and narrow, and by the slender body. The moth has a spread of wings of about 1in., and has the fore wings rather broad and greyish-ochreous, with numerous, short, fuscous streaks, and two or three darker spots, surrounded with whitish scales. The hind wings are grey, and are notched on the hind margin near the base. The larva is dull grey above, dull yellow along the sides; the head, second segment, and spots on the body, are black. It feeds usually on Hogweed (*Heracleum sphondylium*), but also eats Parsnips. It generally lives in the umbels, drawing them together by a web. In this it lies protected, but emerges and drops as soon as the plant is shaken. The larvæ may become hurtful by feeding on the seeds. If necessary, they may be diminished by shaking over anything from which they can be swept up and destroyed; or they may be shaken on to the soil, where they can be trodden on and crushed. The pupæ may be found, occasionally in numbers, in the interior of the Parsnip stems; and they may be collected and destroyed, with the latter, without difficulty. It would be well to clear away all umbelliferous weeds, on which these insects feed.

PARSONSIA (named in honour of Dr. John Parsons, 1705-1770, a Scotch physician and writer on natural history). SYNS. *Heligma*, *Helygia*, and *Spirostemon*. ORD. *Apocynaceæ*. A genus comprising twelve species of greenhouse, glabrous or puberulous, twining shrubs or sub-shrubs, natives of tropical Asia, Australia, and New Zealand. Flowers whitish, small; cymes dichotomous, terminal or shortly pedunculate in the axils, sometimes forming a terminal thyrse. Leaves opposite. For culture, *see* **Dipladenia.**

P. albiflora (white-flowered). *fl.* white, ¼in. long, in many-flowered panicles, odorous; corolla-lobes shorter than the tube. May. *l.* usually 1in. to 2in. long, coriaceous, oblong-ovate or lanceolate, with transverse veins, more rarely linear or obovate, or narrow linear-lanceolate, 3in. to 4in. long, with lobed margins, in young plants spathulate. Stems stout, glabrous or pubescent. New Zealand. SYN. *P. heterophylla* (J. H. S. v. 195). *P. variabilis*, of Lindley, is supposed, by some authorities, to be founded on young specimens of this.

P. heterophylla (variable-leaved). A synonym of *P. albiflora*.

P. velutina (velvety). *fl.*, corolla tube shorter than the calyx; cymes rather small and dense, solitary or few, on opposite, axillary peduncles. July. *l.* on rather long petioles, from broadly-ovate to ovate-oblong, truncate or cordate at base, 2in. to 5in. long. Australia. A tall, woody climber, softly pubescent or villous.

PARTERRE. A French term, used, in this country, to denote a small inclosure or flower-garden, laid out in beds of different sizes and shapes.

PARTHENIUM (an ancient Greek name used by Hippocrates for an allied plant, from *parthenos*, virgin). SYNS. *Argyrochæta*, *Villanova*. ORD. *Compositæ*. A genus comprising about half-a-dozen species of erect herbs, sub-shrubs, or shrubs, natives of North and Central America, and the West Indies. Flower-heads white or yellowish, heterogamous, small, disposed in terminal, sometimes densely corymbose, sometimes loose panicles; achenes glabrous or slightly pilose; involucre broadly campanulate or hemispherical; receptacle small, convex or conical. Leaves alternate, entire, toothed, or pinnately dissected, often scabrous above, more or less canotomentose or slightly glabrous below. *P. Hysterophorus*, the only species calling for mention in this work, is a plant of no particular beauty. It thrives in any common soil. Increased by seeds, sown in bottom heat, in spring; the seedlings should be afterwards hardened off, and transplanted in a warm, sunny spot.

P. Hysterophorus (Hysterophorus). Bastard Feverfew; West Indian Mugwort. *fl.-heads* whitish, disposed in spreading panicles; pappus scales oblong, blunt; involucral scales acute. *l.* twice pinnatipartite, the uppermost ones entire. A tall, greenhouse or half-hardy, hispidulous annual. (B. M. 2275.)

PARTIAL. Secondary; *e.g.*, Partial involucre.

PARTITE. Divided into a number of segments, which extend almost as far as the base of the part to which they belong; *e.g.*, Tripartite, three-parted; Quadripartite, four-parted, &c.

PARTITION. A term applied, botanically, to the deepest divisions into which a leaf can be cut without becoming compound.

PARTRIDGE BERRY. A common name applied to *Gaultheria procumbens* and *Mitchella repens*.

PARTRIDGE PEA. *See* **Heisteria.**

PARYPHOSPHÆRA. A synonym of **Parkia** (which *see*).

PASCALIA (named after Dr. D. Pascal, a professor at Parma). ORD. *Compositæ*. A monotypic genus, the species being an erect, half-hardy, perennial herb, allied to *Rudbeckia*, and having a resinous smell. It should be grown in a dry, warm spot, and needs the protection of a frame in winter. Propagated by divisions, in spring; or by cuttings, inserted under a handlight, in summer. "The plant cultivated in England as *P. glauca* is evidently a species of Sunflower, and has nothing to do with this genus" (Lindley and Moore).

P. glauca (milky-green). *fl.-heads* yellow, nearly 1in. across, terminating each branch, solitary; receptacle chaffy. July. *l.* trinerved, glaucous. *h.* 1½ft. Extra-tropical South America, 1799. (A. B. R. 549.)

PASPALUM (from *Paspalos*, one of the Greek names for Millet). Millet Grass. ORD. *Gramineæ*. A large genus (nearly 160 species) of stove, greenhouse, or hardy grasses, mostly American, a few broadly distributed, two natives of South Europe. Spikes on elongated peduncles, sometimes solitary or twin, sometimes wavy and subdigitate at the apex, or scattered at the sides of the peduncles; spikelets usually biseriate. The species have no horticultural value.

PASQUE FLOWER. *See* **Anemone Pulsatilla.**

PASSIFLORA (from *passio*, passion, and *flos*, *floris*, a flower; a name given by the early missionaries in South America, in allusion to a fancied representation in the blossoms to the implements of the Crucifixion). Passion Flower. Including *Disemma* and *Murucuja*. ORD. *Passifloreæ*. A genus comprising about 120 species of stove, greenhouse, or hardy, climbing, or rarely erect, herbs or shrubs; they are mostly American, but a few are found in Asia and Australia. Flowers hermaphrodite, very rarely unisexual, often showy, axillary, solitary, or racemose; calyx tube short, urceolate, the lobes four or five, linear-oblong or linear, often coloured on the inside; petals four or five, or none, almost equal to the calyx lobes and more-coloured; corona simple or duplex, the exterior of many, one or two-seriate filaments, or membranous and tubular, the interior tubular or absent; gynophore elongated, girded at the base by a thick pitcher; stamens four or five, adnate to the filaments of the gynophore, free at the tips; anthers linear-oblong, versatile. Fruits ovoid or globose, juicy or pulpy, sometimes almost three-valved, many-seeded, in a few species edible. Leaves alternate, rarely opposite, entire, lobed, or parted; petioles often glandulose; tendrils lateral, undivided, rarely absent; stipules two or none, sometimes leafy. One or more of the species of *Passiflora* should always be included amongst plants selected for covering the roof or rafters of either a stove or greenhouse. They are best adapted for large structures; in small houses, close pruning becomes necessary, and the plants, consequently, cannot properly

Passiflora—*continued.*

develop their true characters. The flowers are very beautiful in some species; in all, they are of singular form and extremely interesting.

Propagation is readily effected from cuttings of young shoots, about 6in. long, taken in spring with a heel, and inserted singly in small pots of sandy soil. They should be placed in a close propagating frame, or under a bell glass, where they will root in due course pretty freely. Once rooted, and gradually inured to the open house, the plants grow rapidly, and when repotting rather large shifts may be safely allowed. They may eventually be permanently planted out, and the growth trained over the roof or rafters, or cultivated for a similar purpose in large pots or tubs. Passifloras usually grow freely, and are not over-fastidious regarding soil, provided there is good drainage, and plenty of water is given throughout the growing season. If planted in borders, the roots should be partially restricted, and a depth of soil not exceeding a foot will be sufficient.

FIG. 34. PORTION OF FLOWER-BEARING BRANCH OF PASSIFLORA CÆRULEA.

This should be composed of turfy loam with a small portion of peat and some sharp sand intermixed. Very rich soils are apt to cause an over-luxuriant growth at the expense of the floriferous habit which the plants usually assume. Attention should be devoted to training the shoots and preventing overcrowding by cutting the weakest away, allowing the terminal points of others to hang gracefully. When flowering is over, the main growth may be regulated, thinned, if necessary, and cut in. Both stove and greenhouse species thrive under very similar treatment, except that the latter do not require so much heat as the former, and do not generally grow quite so rapidly. *P. cærulea* succeeds in favourable localities outside. If trained to a south wall, it grows rapidly, and soon covers a large surface. The numerous orange-coloured fruits that ripen towards autumn are as ornamental as the flowers which precede them.

Except where indicated otherwise, the undermentioned species are climbers, and require stove treatment.

Passiflora—*continued.*

P. Actinia (Sea-anemone-like). *fl.*, petals nearly white, oblong, rather longer than the calyx; calyx with a short tube, and a limb of five greenish, oblong lobes; crown of numerous spreading, worm-like filaments, deeply banded with red, blue, and white, inclosing three circles of very minute processes; peduncles axillary, single-flowered. November and February. *l.* about 3in. long, ovate, obtuse, emarginate, the petioles scarcely half as long. Organ Mountains, 1842. (B. M. 4009.)

P. adiantifolia (Adiantum-leaved). A form of *P. Banksii.*

P. alata (winged-stemmed).* *fl.* very sweet-scented; upper side of calyx and petals deep crimson; rays variegated with purple, white, and crimson; pedicels terete; bracts slightly toothed. April to August. *l.* glabrous, somewhat cordate, ovate, acute; petioles bearing four glands; stipules lanceolately-falcate, somewhat serrated. Branches tetragonally winged. Peru, 1772. (B. M. 66; L. B. C. 246.) *P. Buonapartea* is probably a hybrid between this species and *P. quadrangularis.*

P. a. brasiliana (Brazilian). *fl.* solitary, axillary; sepals oblong, very convex, coloured at the edges, each bearing below the end a little bristle; petals longer, but similar, within deep scarlet, outwardly deep violet, with a white streak along the middle; crown about as long as the petals, composed of several rows of tapering processes, which are collected into a cylinder, and are white, with crimson bands on the lower half, deep rich violet on the upper half. September. *l.* about 6in. long, oblong, abruptly pointed; petiole over 1½in. long, with two yellow, conical glands at the upper end; stipules narrow. 1831. SYN. *P. phœnicea* (B. R. 1603).

P. alato-cærulea (winged-blue). *fl.*, petals white inside; calyx lobes rose-coloured on the outside; crown triple; outer filamentous appendages variegated with black, blue, and white; pedicels terete, much longer than the petioles. June to October. *l.* glabrous, cordate, three-lobed; lobes quite entire, ovate-lanceolate; petioles bearing two to four glands. 1823. A garden hybrid between *P. alata* and *P. cærulea.* (B. R. 848.)

P. alba (white).* *fl.* white; superior peduncles longer than the leaves. May. *l.* glabrous, glaucescent beneath, somewhat cordate at base, five-nerved, trilobed; lobes oval, somewhat glandularly serrated at base; petioles biglandular in the middle. Brazil, 1830. SYN. *P. atomaria.* (G. C. n. s. xix., p. 693; R. H. 1883, Fig. 39.)

P. albida (whitish). A synonym of *P. mucronata.*

P. albo-nigra (white and black). *fl.*, petals white; corona blackish-purple below, white above. Summer. *l.* palmately five-lobed. This is said to be a cross between *P. alata* and *P. Raddiana.* (R. G. 1852, 8.)

P. amabilis (lovely).* *fl.*, sepals and petals red within, conformed; filaments of the corona almost quadriseriate, white, shorter than the perianth; peduncles solitary, one-flowered.

Passiflora—*continued.*

May. *l.* membranous, ovate, acute, entire; stipules ovate, acuminate, entire, shorter than the glandulose petioles. Stem slender, terete. South America, 1848. (B. M. 4406.)

P. amethystina (amethystine). *fl.* purplish; margins of corona inflexed; ovary tomentose; peduncles as long as the leaves; bracts absent. November. *l.* trilobed, cordate, glabrous; lobes oblong, obtuse, almost equal, obscurely serrulate; petioles bearing two or three glands. Brazil, 1827. (B. R. 1838, 21, under name of *P. onychina*.)

P. arborea (tree-like). *fl.* 2in. to 3in. broad; perianth tube 1½in. to 2in. long, terete, green; sepals and petals similar and equal, greenish-white inside; corona triple; the outer of yellow filaments nearly two-thirds as long as the petals; the middle a ring of short filaments round the mouth of the tube; inner of fimbriate scales, pressing against the column; peduncles pendulous, three to six-flowered; bracts none. July. *l.* drooping, 6in. to 2½ft. long, oblong, elliptic, or obovate; petioles stout, cylindric, 1in. to 1½in. long. Stem slender, erect, terete, 1ft. to 14ft. high, sparingly branched; branches horizontal or drooping. New Grenada, &c., 1807. An interesting species, from its erect habit and peculiar appearance. SYN. *P. glauca* (of Humboldt). (B. M. 5864.)

P. atomaria (dotted). A synonym of *P. alba*.

P. atropurpurea (dark purple). *fl.* 3in. in diameter; tube short, white inside; sepals reddish-violet; petals crimson; coronal threads violet, spotted with white. 1883. Garden hybrid. Greenhouse.

P. aurantia (orange). A synonym of *P. Banksii*.

P. Banksii (Banks'). *fl.* sometimes pale on first opening, but soon becoming brick-red or dull scarlet, on pedicels much shorter than the leaves; calyx lobes 1½in. or more long; petals scarcely ¾in. long, narrow; inner corona broadly tubular, plicated, and shortly lobed at the orifice; outer one of a single row of filaments. July. *l.* broad, usually under 3in. long, with three broad, obtuse lobes, rarely divided to the middle of the leaf, each lobe sometimes two or three-lobed. Australia. Greenhouse. SYNS. *P. aurantia* (A. B. R. 295), *Disemma aurantia* (B. M. 4140). *P. adiantifolia* (B. R. 233; L. C. B. 36, under name of *Murucuja Baueri*) is a mere form of this species.

P. Belottii (Belotti's). *fl.* large and showy; sepals flesh-coloured, tinged with green; petals delicate light rose-colour; rays of the corona blue, with indistinct transverse purple bars. Summer. *l.* large, glabrous, alternate, deeply three-lobed; lobes acuminate, entire. Stems round, tendrilled. 1847. A robust hybrid between *P. cæruleo-racemosa* and *P. quadrangularis*. (G. M. B. i. 9.)

P. biflora (two-flowered). A synonym of *P. lunata*.

P. cærulea (blue-flowered).* *fl.* faintly scented, lasting but one day; calycine segments pale greenish-white, the petals of nearly the same shape and size; styles purplish; rays of the corona in two circles, purple at the bottom, white in the middle, and blue at the ends; bracts ovate, entire. June to October. *fr.* egg-shaped, yellow when ripe. *l.* glabrous, five-parted; lobes oblong, quite entire; petioles bearing four glands at the apex; stipules falcate. Brazil and Peru, 1699. Hardy. See Fig. 34. (B. M. 28.) *P. chinensis* (of gardens) and *P. Mayana* are probably forms of this species. *P. Hartwiesiana* is probably a seedling variety with white flowers. CONSTANCE ELLIOTT is a fine seedling form with white-scented flowers, raised by Lucombe and Pince, Exeter.

P. c. Colvillei (Colville's). *fl.* whitish; petals tinged with blue; outer corona variegated with purple, white and blue. *l.* with oblong-lanceolate, serrulated lobes; petioles biglandular at apex. Said to be a hybrid between *P. cærulea* and *P. incarnata*. (S. B. F. G. 126.)

P. cæruleo-kermesina (blue and carmine). This is probably a hybrid between *P. cærulea* and *P. Raddiana*.

P. cæruleo-racemosa (blue-racemose).* *fl.* purple; pedicels axillary, solitary, one-flowered. June to October. *l.* quite glabrous, rather coriaceous, three to five-lobed; lobes undulated, somewhat toothed at the base; petioles bearing four glands. A hybrid between *P. cærulea* and *P. racemosa*. Greenhouse or nearly hardy. (L. B. C. 573.)

P. capsularis (capsular). *fl.* yellow and green; pedicels solitary, ovary elliptic-oblong, and, as well as the fruit, acutely hexagonal, glabrous. June and July. *fr.* purple when ripe, small. *l.* downy, cordate at base, two-lobed, with an awn in the recess between the lobes, and, as well as the petioles, glandless. Tropical America, &c., 1820. (B. M. 2868.)

P. c. acutiloba (acutely-lobed). *l.* deeply two-lobed, hardly pubescent above, painted with white.

P. c. geminiflora (twin-flowered). *fl.*, pedicels twin. *l.* glabrous, hardly cordate at base. Branches triangular.

P. cincinnata (curled).* *fl.* pale violet-purple, bold, showy, axillary; corona of long and singularly curled and twisted, dark violet ciliæ, marked with alternate bands of white and purple near the base. August. *l.* deeply digitately lobed, glossy dark green. Stems glabrous. Brazil, 1868. Greenhouse. (B. M. 5737; G. C. 1868, p. 966.)

P. cinnabarina (cinnabar-red).* *fl.* scarlet, axillary, solitary, widely spreading, 2½in. in diameter; outer corona of a single series of erect filaments; inner shorter, membranous, deeply plicate.

Passiflora—*continued.*

March. *l.* usually deeply trifid, occasionally five-lobed, subcordate or distinctly cordate at the base, with a wide sinus; lobes ovate or ovate-elliptical, entire, or the medium lobe with a broad, obtuse, lateral tooth on each side. Australia. (B. M. 5911.)

P. coccinea (scarlet-flowered).* *fl.* scarlet, with orange-coloured rays; bracts ovate, sub-serrated, velvety. June to November. *fr.* full of sweet, juicy, edible pulp. *l.* glabrous, ovate, coarsely toothed, slightly acute; petioles bearing four to six glands. British Guiana, Brazil, and Peru, 1820. (B. H. xvi., xiii., under name of *P. fulgens*.)

P. cuprea (coppery). *fl.* orange-coloured, with a purple calyx; petals oblong-linear, shortly exceeded by the calyx; coronal leaflets linear, blunt; pedicels single, much exceeding the petiole, the uppermost racemose. July. *l.* roundish-oval, entire, mucronulate, shortly petioled, reticulated on both sides. Bahamas, 1724.

P. Decaisneana (Decaisne's). *fl.* about 4in. in diameter; sepals and petals brilliant carmine on the inside; rays of the corona barred with purplish and white below, deep bluish-purple and white towards the tips. Summer. *l.* about 3in. long; petioles stout, bearing three pairs of glands; stipules elliptic. A hybrid between *P. alata* and *P. quadrangularis*. (F. d. S. viii. 848.)

P. discolor (discoloured). A synonym of *P. Maximiliana*.

FIG. 35. FRUIT AND LEAVES OF PASSIFLORA EDULIS.

P. edulis (edible).* *fl.* white, tinged with purple, fragrant; corona about equal in length to the calyx lobes; ovary glabrous; bracts glandularly serrated. July and August. *fr.* livid-purple when ripe, elliptic, 1½in. in diameter, edible; pulp orange-coloured, with an acid taste resembling the flavour of an orange. *l.* glabrous, trilobed, serrated; petioles biglandular at the apex. Brazil. The fruit of this species is produced in abundance. See Fig. 35. (B. M. 1989; B. R. 152, under name of *P. incarnata var.*)

P. e. verrucifera (warted). *fl.* very curious and pretty; sepals white within, twice as broad as the white petals; coronal rays dark purple, two-seriate, equal, shorter than the petals; bracts and sepals warted. April. *l.* glabrous, three-lobed, serrated,

Passiflora—*continued.*

obtuse or cuneate at base; petioles biglandular at the apex, twice as long as the peduncles; stipules setaceous, almost equalling the peduncles. Brazil, 1837. Greenhouse. (B. R. 1840, 52, under name of *P. verrucifera.*)

P. filamentosa (filamentous). *fl.* with whitish petals and blue corona coloured similarly to those of *P. cærulea*; corona longer than, or nearly equalling, the calyx; bracts serrated. July to October. *l.* glabrous, five-parted, serrated; petioles biglandular in the middle. South America, 1817. (B. M. 2023; B. R. 584.) SYN. *P. palmata* (L. B. C. 97).

P. fœtida (stinking). Wild Water Lemon. *fl.* whitish, the corona variegated with purple and blue. May to October. *l.* villous on both surfaces, five-nerved, cordate at base, three-lobed; lobes nearly entire, lateral ones very short, middle one acuminated; petioles, as well as the stems, hispid. Tropical America, &c., 1731. Annual, or rarely perennial. SYNS. *P. hircina* (of gardens), *P. hirsuta.* (L. B. C. 138.)

P. f. ciliata (ciliate-leaved). *fl.*, petals greenish on the outside, red within; rays of corona variegated with white and purple; stipes of ovary deep purple, with darker spots. July to September. *l.* glabrous, somewhat five-nerved, cordate at base, trifid; lobes acuminated, ciliated. Jamaica, 1783. (B. M. 288.)

P. f. nigelliflora (Nigella-flowered). *fl.*, segments five, pale green without, white within, oblong; petals white, the same shape; filaments of nectary white, bluish at the tip, inclosing a double circular disk; involucre of three pinnatifid leaves. September. *l.* cordate, five-lobed, hairy, or almost silky on both sides, emitting a fœtid odour when bruised. Stem and petioles hairy. Mexico, 1835. (B. M. 3635, under name of *P. nigelliflora.*)

P. fulgens (shining). A synonym of *P. coccinea.*

P. glauca (glaucous), of Aiton. A synonym of *P. stipulata.*

P. glauca (glaucous), of Humboldt. A synonym of *P. arborea.*

P. gracilis (slender). *fl.* whitish; rays of corona blue and white; peduncles axillary, solitary. August. *fr.* egg-shaped. *l.* subcordate, glabrous, three-lobed; lobes roundish, beset with two to four glands; petioles bearing two glands. 1823. (B. R. 870.)

P. Hahnii (Hahn's).* *fl.* white, 3in. across, with a double yellow corona. Summer. *l.* peltate, oval, bright green above, reddish on the under surface. Mexico, 1870. Greenhouse. (G. C. n. s., x. 305, xii. 504; R. H. 1869, 430, under name of *Disemma Hahnii.*)

P. Herbertiana (Lady Carnarvon's). *fl.* solitary or in pairs, rather large, on pedicels shorter than the leaves; calyx lobes greenish-white or pale orange-yellow, nearly 1½in. long; petals narrow, scarcely ⅔in. long; inner corona about ½in. long, crenate or shortly lobed; outer one rather shorter, of a single row of filaments. July to September. *l.* broad, truncate or slightly cordate at base, with three triangular, almost acute, lobes, pubescent on both sides; petioles biglandular. Australia, 1821. SYN. *Disemma Herbertiana.* (B. R. 737.)

P. hircina (goat-scented). A garden synonym of *P. fœtida.*

P. hirsuta (hairy). A synonym of *P. fœtida.*

P. holosericea (wholly-silky). *fl.* white, spotted with red; rays of corona variegated with purple and white. May to August. *l.* ovate, somewhat trilobed, aristately toothed at the base; petioles biglandular. Vera Cruz, 1733. Plant clothed with soft, velvety down. (B. M. 2015; B. R. 59.)

P. Hulletti (Hullett's). A garden synonym of *P. macrocarpa.*

P. Imperatrice Eugénie (Empress Eugénie's). *fl.* about 4in. across; petals white, tinged on the inside with reddish-lilac; rays of the corona white, with regular transverse bars of blue, which become reddish-purple towards the base. Summer. *l.* deeply three-lobed, the lobes slightly mucronate. 1858. Apparently a cross between *P. cærulea* and *P. quadrangularis* or *P. alata.* (I. H. 1858, 175.)

P. incarnata (flesh-coloured).* May Apple. *fl.* sweet-scented; petals white; corona having a double circle of purple rays; bracts glandularly serrated; ovary villous; calyx lobes pale green. July and August. *fr.* orange-coloured, about the size of an apple, with a sweetish, yellow pulp. *l.* glabrous, somewhat cuneate at base, five-nerved, deeply trifid; lobes lanceolate, serrated; petioles biglandular at apex. Southern United States, 1629. A greenhouse perennial, sending up annually a number of herbaceous shoots. (B. M. 3697.)

P. Innesii (Innes').* *fl.* very handsome; sepals white internally; petals whitish, thickly speckled with red; corona in many rows, white, banded with red at the base, violet-spotted above the middle, and white at the apex. 1870. A fine garden hybrid between *P. alata* and *P. macrocarpa.*

P. insignis (remarkable). A synonym of *Tacsonia insignis.*

P. jorullensis (Jorullo). *fl.* orange, twin, small; calyx segments five, expanded; corolla connate with the calyx, five-fid, the laciniæ revolute-deflexed, much shorter than the calyx; corona double; peduncles above 1in. long, articulated at apex. June. *l.* bilobed; lobes reniform, obtuse, mucronulate, broadly rotundate, purplish-glaucescent beneath; stipules linear, small. Central America, 1852. SYN. *P. Medusæa.* (B. M. 4752; F. d. S. v. 528; L. & P. F. G. i., f. 59.)

P. kermesina (carmine). A synonym of *P. Raddiana.*

P. laurifolia (Laurel-leaved). Jamaica Honeysuckle; Water Lemon. *fl.* red and violet, sweet-scented; bracts obovate, glandularly serrate at the apex. June and July. *fr.* yellow, with white spots, the size of a hen's egg, but rather more elongated, containing a whitish, watery, edible pulp. *l.* glabrous, ovate-oblong, entire; petioles biglandular at the apex; stipules setaceous, the length of the petioles. West Indies and South America, 1690. (B. R. 13.) SYN. *P. tiniifolia* (B. M. 4958).

P. Lawsoniana (Lawson's). *fl.* 3in. to 4in. across; calyx lobes reddish-brown in the interior; petals reddish, oblong-obtuse, shorter than the sepals; corona in many rows, the outer filamentous. Summer. *l.* sub-peltate, rather thick, ovate-oblong, slightly cordate, acuminate, entire. 1868. A hybrid between *P. alata* and *P. racemosa.*

P. ligularis (strap-shape-stipuled). *fl.* green and purple, particoloured; bracts ovate, entire. September. *l.* glabrous, cordate, acuminate, entire; petioles bearing four to six cylindrical glands; stipules ovate-lanceolate, acuminated. Peru, 1819. (B. M. 2967.) SYN. *P. Lowei* (R. G. 1852, 9).

P. Lowei (Lowe's). A synonym of *P. ligularis.*

P. lunata (lunate). *fl.* white, the rays of the corona yellow; pedicels twin, jointed above the middle; calyx exceeding the corolla. June to August. *l.* glabrous, glandular beneath, cordate at base, three nerved, truncate, somewhat bi- or trilobed; petioles short, glandless. West Indies and South America, 1800. (B. M. 2354; B. R. 577.) SYN. *P. biflora.*

P. lutea (yellow). *fl.* pale yellow, on twin pedicels; filaments of the corona in three rows, shorter than the sepals. May and June. *l.* almost glabrous, cordate, trifid; lobes ovate, mucronate by a bristle, and, as well as the petioles, glandless. North America, 1714. Hardy. (B. R. 79.)

P. macrocarpa (large-fruited). *fl.* white and purple. Summer. *fr.* of a delicate flavour, and acquiring a weight of 8lb. and upwards. *l.* large, oval, obtuse. Stem quadrangular. Rio Negro, 1866. A vigorous-growing climber. SYN. *P. Hulletti* (of gardens).

P. maculata (spotted). *fl.* greenish; pedicels solitary or twin, rather pilose. June and July. *l.* glabrous, deeply three-lobed, painted with white on the upper surface; lobes nearly equal, oblong, acute, upper ones bluntly trifid, intermediate one larger than the others; petioles glandless. Curassoa, 1820.

P. maliformis (Apple-form-fruited). Sweet Calabash. *fl.* of various shades, sweet-scented, large, and beautiful; petals white; rays blue; outer divisions of flower red; bracts ovate, acute, joined at the base, larger than the flower. July to November. *fr.* dingy yellow, round, smooth, about 2in. in diameter, full of agreeable, gelatinous, pale yellow pulp. *l.* glabrous, ovate, somewhat cordate at base, acuminated, entire; petioles biglandular. Tropical America, &c., 1731. (B. R. 94.)

P. marmorea (marbled). A garden synonym of *Ophiocaulon cissampeloides.*

P. Maximiliana (Prince Maximilian's). *fl.* greenish, with a white corona; pedicels solitary or twin, longer than the petioles. May and June. *l.* glabrous, divaricately bilobed, drawn out a little in the middle, somewhat cordate at base, red and biglandular beneath; petioles glandless. Brazil, 1800. SYNS. *P. discolor* (L. B. C. 565), *P. vespertilio* (B. R. 597).

P. Medusæa (Medusa's). A synonym of *P. jorullensis.*

P. Mooreana (Moore's). *fl.*, calyx tube short; limb of five oblong segments; petals white; corona with the outer ray blue, nearly as long as the petals, variegated below with white and darker blue; intermediate one deep blue, very short; inner one red-purple, erect; peduncles one-flowered. July. *l.* almost sessile, 3in. to 5in. long, cuneate, deeply palmato-trifid, obscurely serrate; stipules large, ovate. Buenos Ayres, 1837. (B. M. 3773.)

P. mucronata (mucronate). *fl.* white, with a yellowish corona; column inclined; stamens secund; pedicels twice the length of the leaves; bracts soon falling off. August and September. *l.* glabrous, roundish-cordate, entire; petioles biglandular in the middle; stipules ovate-lanceolate, setosely apiculated. Brazil, 1816. (B. R. 677, under name of *P. albida.*)

P. Munroi (Munro's). *fl.* 2in. to 3in. across; petals five, whitish externally, violet within, oblong, as long as the calyx lobes; corona in several series, violet, rich purple, and whitish. Summer. *l.* 3in. to 5in. long, 4in. to 6in. broad, palminerved, cordate at base, deeply three-lobed. 1868. A very elegant greenhouse hybrid between *P. alata* and *P. cærulea.*

P. Murucuia (Murucuia). *fl.* deep red, solitary, axillary. July. *fr.* flesh-coloured when ripe, size of a pigeon's egg. *l.* glabrous, glandular beneath truncately two-lobed at the apex; lobes obtuse, divaricate. West Indies, 1730. SYN. *Murucuja ocellata.* (B. R. 574.)

P. onychina (onyx-coloured). A synonym of *P. amethystina.*

P. organensis (Organ Mountains). *fl.* greenish-white, having a violet-coloured corona, tipped with white. Summer. *l.* having ovate, obtuse, lateral lobes, and a broad, very obtuse, central one, the under surface claret-coloured. Brazil, 1869.

P. o. marmorata (marbled). *l.*, upper surface prettily mottled with whitish or yellowish blotches. Brazil, 1869.

P. palmata (palmate). A synonym of *P. filamentosa.*

Passiflora—*continued.*

P. peltata (peltate-leaved). *fl.* greenish; calyx pale, large; corona filamentous; pedicels solitary, jointed about the middle. August and September. *l.* pubescent above, glandless, three-nerved, rather peltate, three-lobed beyond the middle; lobes lanceolate, divaricated; petioles biglandular in the middle. West Indies, &c., 1778. (B. R. 507.)

P. penduliflora (pendulous-flowered). *fl.* pale yellow and green; crown one-seriate, twelve to fourteen-partite; segments orange-coloured, much exceeded by the petals; pedicels simple, solitary or twin, often elongated, pendulous. August. *l.* roundish, slightly trilobed at the sinuate or sub-truncate top; lobes broadly rounded, mucronulate, erect. West Indies, 1848. (B. M. 4565.)

P. perfoliata (perfoliate-leaved). *fl.* on pedicels much exceeding the petioles; calyx crimson; petals oblong-lanceolate, exceeding the calyx; rays fleshy-green, with blunt, scarlet tips. April to September. *l.* velvety, cordate at base, two-lobed, with an awn in the recess between the lobes, glandless beneath, and on the petioles. West Indies, &c., 1831. (B. R. 78.)

P. phœnicea (crimson). A synonym *P. alata brasiliana.*

P. picturata (painted-leaved). *fl.* red; calyx lobes reflexed, twice the length of the filamentous crown; outer crown beautifully variegated with blue and white. September. *l.* sub-peltate, reddish beneath, three-lobed; lobes quite entire, mucronate by a bristle; recesses and petioles bearing four glands. Brazil, 1820. (B. R. 673; L. B. C. 1050.)

P. princeps (princely). A synonym of *P. racemosa.*

P. punctata (dotted), of Loddiges. A synonym of *P. tuberosa.*

P. quadrangularis (quadrangular-stemmed).* Granadilla. *fl.* highly odoriferous; calycine lobes white within; petals of the same shape, red within, and white outside; corona five-fold, the outer rays in a double row, longer than the petals, round, white, and variegated with violet; bracts entire. August and September. *fr.* greenish-yellow, oblong, about 6in. in diameter, containing a succulent, purple, edible pulp, of a sweet and slightly acid flavour. *l.* glabrous, cordate at base, ovate, acuminated; petioles bearing four or six glands; stipules ovate, entire. Branches tetragonally winged. Nicaragua, 1768. Largely cultivated in the tropics. (B. R. 14.) The variety *aucubifolia* has variegated leaves.

FIG. 36. LEAF AND INFLORESCENCE OF PASSIFLORA RACEMOSA.

P. racemosa (racemose).* *fl.* of a deep red or scarlet colour; pedicels twin, forming terminal, pendulous racemes; in consequence of the upper leaves becoming abortive. March to October. *l.* quite glabrous, rather peltate, glaucous beneath, for the most part trilobed; petioles usually bearing four glands. Brazil, 1815. See Fig. 36. (B. M. 2001; B. R. 285.) SYN. *P. princeps* (L. B. C. 84). *P. Madonna* is said to be a cross between *P. racemosa* and *P. Buonapartea*, the latter itself a hybrid between *P. alata* and *P. quadrangularis*. BIJOU is said to be a hybrid between *P. racemosa* and *P. Raddiana*.

P. Raddiana (Raddi's).* *fl.* richly coloured, produced in great abundance; calyx blood-colour, the segments linear-oblong, acute, the tube short; petals the same colour, and equal or slightly larger, flat, very spreading, at length reflexed; corona in one series of short, spreading, purple filaments; peduncles solitary, axillary, slender, much longer than the leaves. Autumn. *l.* trilobed, cordate, dark shining green above, vinous beneath; lobes serrulate at base; petioles terete, biglandular; stipules leaf-like, semi-cordate, sub-cirrhose at apex. Brazil. 1831. See Fig. 37. (B. M. 3503; B. R. 1633, under name of *P. kermesina.*) *P. Loudoni* is considered by Dr. Masters to be a cross between this species and *P. racemosa*. *P. Comte Woronzoff* is said to be a form of *P. Raddiana.*

P. rubra (red-berried). *fl.* greenish-yellow; calyx exceeding the corolla; crown three-seriate, the exterior filaments reddish,

Passiflora—*continued.*

nearly as long as the petals; pedicels solitary; ovary hairy April to September. *fr.* red, hairy, ovoid or sub-globose. *l.* velvety, cordate at base, two-lobed, with an awn in the recess between the lobes, glandless beneath and on the petioles. Tropical America, 1831. (B. R. 95.)

P. sanguinolenta (blood-red). *fl.* reddish-violet, small, axillary, solitary; corona violet-coloured below, white at the tips. Summer. *l.* five-nerved, bilobed, with the lobes divergent. Columbia and Peru, 1868. A slender-growing climber.

FIG. 37. PASSIFLORA RADDIANA.

P. serratifolia (saw-edge-leaved). *fl.* with purple petals, the filaments of the crown pale purple at the base, and thence bluish: pedicels pubescent. May to October. *l.* pubescent beneath, ovate-lanceolate, acute, serrulated, feather-nerved; petioles pubescent, bearing four glands. Mexico, &c., 1731. (B. M. 651.)

P. sicyoides (Sicyos-like). *fl.* whitish, very fragrant; peduncles twin; bracts filiform, small, approximating the flower. July. *l.* cordate, three-lobed, sharply sub-dentate or quite entire, glaucous beneath, hairy, biglandular in the recesses, smoothish above; lobes triangularly acuminated, the middle one longest; petioles hairy, biglandular in the middle; glands large, clavate. Mexico and Brazil, 1838.

P. stipulata (stipuled). *fl.* whitish, the crown variegated with purple and white; peduncles about equal to the petioles; bracts entire. August and September. *l.* glabrous, glaucous beneath, cordate at base, five-nerved, trifid; lobes ovate, entire; petioles bearing two or four glands; stipules oblong, somewhat auricled, mucronate, entire. Brazil, &c., 1779. SYN. *P. glauca* (of Aiton). (B. R. 88.)

P. suberosa (cork-barked). *fl.* of a greenish-yellow colour, the short crown purple at the bottom; pedicels twin. June to September. *fr.* purple when ripe, ovoid. *l.* glabrous, somewhat ciliated, five-nerved at the base, ovate, somewhat cordate, usually three-lobed; lobes ovate, acute, the middle one larger than the rest; petioles biglandular above the middle. West Indies, &c., 1759.

P. s. angustifolia (narrow-leaved). *fl.* yellowish, with the rays purple at the base; pedicels solitary or twin. June to September. *l.* glabrous, glandless, somewhat peltate; lower ones ovate, the rest lanceolate, two or three-lobed; petioles short, biglandular above the middle. West Indies, 1773. (B. M. 1983; B. R. 188.)

P. s. minima (least). *fl.* greenish-yellow, with white rays; nectary fourfold; inner one with an entire, brown rim; outer

Passiflora—*continued.*

plaited, of a dusky purple colour; another ciliated with capillary, black hairs, with yellow tips, the outermost one having the filamentous appendages twice as long as the others, dark purple at base, and yellow from the middle to the tip; pedicels twin. July and August. *l.* glabrous, glandless, five-nerved, trifid; lobes ovate, the middle one drawn out most; petioles biglandular at the apex. Tropical America, 1690. (B. R. 144.)

P. s. pallida (pale-flowered). *fl.* yellowish-green, small; corona short; pedicels one to three together. August and September. *l.* glabrous, ovate, acuminated, three-nerved; petioles biglandular above the middle. Florida and West Indies. (B. R. 660.)

P. tinifolia (Laurestine-leaved). A synonym of *P. laurifolia.*

P. trifasciata (three-banded). *fl.* white, fragrant. Summer. *l.* trilobate, evergreen, marked down the centre of each lobe by a broad irregular band of reddish-purple, the back of the leaf being of a dark sanguineous hue. Para, 1868. (I. H. 544.)

P. tuberosa (tuberous-rooted). *fl.* greenish-white; outer corona green at the base, tipped with purple and white; style purple; pedicels twin. June to October. *l.* glabrous, glandular beneath, rounded at the base, three-nerved, three-lobed at the apex; the lower ones usually painted with white on the upper surface; lobes oblong, acute, the middle one very small; petioles glandless. Branches of root tuberous. South America, 1810. (B. R. 432.) SYN. *P. punctata* (L. B. C. 101).

P. tucumanensis (Tucuman). *fl.* about 2in. in diameter; petals white; corona doubly filamentous, the outer series white, barred with purplish-blue, equalling the petals; inner series white, tipped with blue, very short; bracts almost equalling the calyx segments, loosely cordate, serrate; peduncles one-flowered, tribracteate. July. *l.* broadly cordate, petiolate, trilobed; lobes oblong, deeply glandulose-serrate, glaucous beneath. Brazil, &c., 1836. Plant very glabrous. (B. M. 3636.)

P. vespertilio (bat-like). A synonym of *P. Maximiliana.*

P. vitifolia (Vine-leaved). *fl.* yellowish; outer corona orange-coloured; inner corona white; bracts glandularly toothed. July. *l.* downy beneath, cordate, deeply three-lobed; lobes ovate, acuminated, sharply toothed, with the sinuses biglandular; petioles biglandular at the base, pubescent. South America, 1823.

P. Weberiana (Weber's). *fl.* white, 2in. in diameter; filaments of corona banded with white; ovary densely setose; peduncles axillary, solitary. Summer. *l.* large, 3in. to 5in. long, 4½in. to 9in. broad, three-lobed; lobes broadly ovate-oblong, acute, sinuate-toothed, the base deeply cordate; stipules leafy, falcate-oblong. Stem covered with glandular hairs. Argentine Republic, 1885.

PASSIFLOREÆ. An order of trees, shrubs, or herbs, with watery juice, of variable habit, erect, climbing or twining, natives of tropical and sub-tropical regions, but most numerous in South America. Flowers solitary, racemose, or cymose-paniculate, usually showy, hermaphrodite or unisexual, usually regular; calyx tube short or elongated, coriaceous or herbaceous, persistent, in two cases absent; lobes three to many, coriaceous, valvate or imbricated; petals absent, or as many as the calyx lobes, inserted at the throat, tube, or base of the calyx, free, or connate in a campanulate corolla, induplicately valvate or imbricated; corona at the throat or base of the calyx simple or duplex, tubular, or cut into radiating or erect filaments, or rarely absent; disk urceolate or annular, rarely absent; stamens three to five, or rarely many, in a few cases many-seriate, perigynous, or inserted with the petals at the calyx throat, the filaments subulate or filiform. Fruit a many-seeded, dehiscent or indehiscent, berry or capsule. Leaves alternate or rarely opposite, petiolate, simple, lobed, palmately three to seven-foliolate, very rarely pinnate or decompound, sometimes glandular; stipules none or twin, deciduous or persistent; tendrils circinate or spirally twisted. Several species of *Passiflora* are of economic value, some of them having edible fruits. The order comprises nineteen genera and about 250 species. Examples: *Carica*, *Gynopleura*, *Passiflora*, and *Tacsonia.*

PASSION-FLOWER. *See* **Passiflora.** The term is also applied to the species of *Tacsonia.*

PASTINACA. Included under **Peucedanum** (which *see*).

PASTINACA OPOPONAX. A synonym of **Malabaila Opoponax** (which *see*).

PATAGONULA (from the name of the native country of the genus—Patagonia). ORD. *Boragineæ.* A genus comprising only a couple of species of greenhouse, glabrous or pubescent, South American shrubs. Flowers small, loosely corymbose, cymose at the tips of the branches; calyx broadly campanulate, five-fid above the middle; corolla campanulate-sub-rotate, semi-five-fid, with imbricated (not folded) lobes. Leaves alternate or clustered at the apices of the branches, entire or serrate, penniveined, reticulated. *P. americana*, the only species introduced, grows well in an equal mixture of loam and peat. It may be increased by cuttings, inserted in the same kind of soil, under a glass.

P. americana (American). *fl.* white or greenish-white, smelling like those of the Elder. June to August. *l.* glabrous on both surfaces, lanceolate or oblong-lanceolate, tapering into the short petioles, and sub-cuneated at the base, generally acute, rarely obtuse, at the apex; younger ones cuneate-obovate, entire or serrated towards the top; largest ones 2½in. long, margined. *h.* 10ft. to 12ft. 1732.

PATANA PALM. *See* **Œnocarpus Batana.**

PATANIA. Included under *Dicksonia.*

PATCHOULI PLANT. A common name of **Pogostemon Patchouli** (which *see*).

PATELLIFORM. Shaped like the patella or knee-pan; disk-shaped; circular, with a rim.

PATENS, PATENT. Spreading widely open, or diverging widely from an axis.

PATERSONIA (named after Col. W. Paterson, an English traveller in South Africa of the last century). SYN. *Genosiris.* ORD. *Irideæ.* A genus comprising nineteen species of handsome, greenhouse, perennial herbs, with short rhizomes, all natives of extra-tropical or sub-tropical Australia. Flowers two or several in a spathe, rarely solitary, sessile or very shortly pedicellate; perianth blue, or very rarely yellow or white; tube slender, sometimes long; three outer lobes broad and spreading; three inner ones small, erect, sometimes minute or absent; bracts membranous, more or less scarious. Leaves radical, or clustered at the base of the stems, distichous, narrow-linear, grass-like or rigid. The best-known species are described below. They thrive in a sandy-peat compost. Propagation may be effected by division, or by seeds.

P. glabrata (glabrous). *fl.* purple; perianth tube shortly exceeding the bracts; scapes or peduncles one or sometimes two to the stem, rarely exceeding the leaves. June. *l.* distichous; lower ones very short; upper ones 6in. to 12in. long, rarely above two lines broad. Stem slender, 3in. to 6in. high. 1814. SYN. *P. media.* (L. B. C. 768.)

P. glabrata (glabrous), of "Botanical Register." A form of *P. sericea.*

P. glauca (glaucous). *fl.* blue; perianth tube exceeding the bracts by three to five lines; spike with the two outer bracts 1½in. to 1⅔in. long, each spikelet bearing three or four flowers; scapes usually much shorter than the leaves, but occasionally exceeding them. June. *l.* rigid, erect, the longest from 6in. to 18in. long, and nearly two lines broad. Stems very short, clustered on the rhizome, with a few outer scales gradually passing into leaves. 1820. (B. M. 2677; L. B. C. 1182.)

P. media (intermediate). A synonym of *P. glabrata.*

P. occidentalis (Western). *fl.* usually numerous, rarely only three, in each spikelet; perianth rich blue, the tube shortly exceeding the bracts; outer bracts 1½in. or more long. May. *l.* rigid, the longest often above 1ft. long, usually two to three lines broad. Stems very short. 1824. (B. R. 1839, 60, under name of *P. sapphirina.*)

P. sapphirina (sapphire-colour-flowered). A synonym of *P. occidentalis.*

P. sericea (silky). *fl.* deep violet-blue, in a stout and usually many-flowered spike; outer segments of limb broadly ovate; inner ovate or lanceolate; outer bracts 1½in. to 2in. long, at first silky-woolly; scapes usually about 1ft. high. June. *l.* radical, long, erect, and rigid, rarely above two lines broad, the edges very woolly at base when young. Stems scarcely any. 1803. (B. M. 1041.) *P. glabrata* (B. R. 51) is regarded, by Bentham, as merely a glabrous form of this species.

PATHS. Narrow walks intended for dividing up vegetable quarters, &c., and affording facilities for executing work more readily. They vary in width

Paths—*continued.*

from 1½ft. to 3ft., but are subordinate to all main walks in a large garden, and frequently are not made with anything beyond the ordinary soil. Where Paths are intended to be permanent, they may be much improved if a shallow bed of clinkers, or rough gravel, is laid down, and covered with finer gravel, or ashes. The term Paths, or alleys, further denotes the divisions allowed between seed-beds.

PATIENCE, or **HERB PATIENCE** (*Rumex Patientia*). A hardy perennial, native of Europe, &c., the leaves of which were formerly much used in the place of Spinach, and, in the early part of the season, as a substitute also for Sorrel. It may readily be raised from seed, sown about March, in drills 1½ft. asunder, the plants being eventually thinned to 1ft. apart in the rows; or seeds may be sown broadcast, and the seedlings afterwards transplanted at similar distances. Division of an established stock may also be practised. To maintain a supply of young leaves, which alone are of any use, the stems should be occasionally cut over. This will also prevent the ripening and distribution of seed by the wind. A good soil, and a rather moist situation, are most suitable, but the plants grow well under almost any circumstances.

PATRINIA (named in honour of E. L. Patrin, 1742-1814, French traveller in Siberia, &c.). SYNS. *Fedia* (of Adanson), *Mouffetta*. ORD. *Valerianeæ*. A genus of erect, glabrous or loosely villous, hardy, perennial herbs. About nine or ten species have been proposed, but several authors reduce these as varieties of two only; they are natives of Central and extra-tropical Eastern Asia. Flowers disposed in corymbose-paniculate cymes; calyx limb small, obtusely sub-dentate; corolla yellow, with a very short tube, and a limb of five spreading lobes. Leaves once or twice pinnatifid or pinnatisect; radical ones rarely entire. The plants described below are those best known to gardeners. They will succeed in any light, rich soil; and may be increased by seeds.

P. rupestris (rock-loving). *fl.* fragrant, smaller than those of *P. sibirica*; corymbs sub-umbellate. May and June. *l.* membranous, pinnatifid; segments lanceolate, the terminal one large. Stem smoothish or rather downy. *h.* 1ft. Siberia, 1801. (B. M. 714, under name of *Valeriana sibirica*.)

P. scabiosæfolia (Scabious-leaved). *fl.* disposed in loose, rather penicled corymbs. May to July. *l.*, radical ones ovate or oblong, deeply serrated, pilose; stem ones pinnatifid, with lanceolate-linear, acute segments, the terminal one being very long. Stem glabrous. *h.* 1ft. Northern Asia, 1817. (L. B. C. 1340; S. B. F. G. [illegible])

P. sibirica (Siberian). *fl.* with a fragrance somewhat like that of Jessamine. May and June. *l.* rather fleshy; radical ones spathulate, entire, toothed or serrated, but sometimes pinnatifid at the apex; cauline ones pinnate, with entire, usually obtuse, segments. Stem glabrous. *h.* 1ft. Siberia, &c., 1751. (B. M. 2325, under name of *Valeriana ruthenica*.)

PATRISIA. A synonym of **Ryania** (which *see*).

PATTONIA. A synonym of **Grammatophyllum** (which *see*).

PATULOUS. Moderately spreading.

PAUCIFLORUS. Few-flowered.

PAUCIFOLIUS. Few-leaved.

PAULLINIA (named after Ch. Fr. Paulli, 1643-1742, a Danish botanist). ORD. *Sapindaceæ*. This genus comprises about eighty species of climbing and twining, evergreen, stove shrubs, confined, with one or two exceptions, to the tropical regions of the Western hemisphere. Flowers pale, small, in axillary racemes; sepals five, concave, imbricate; petals four, bearing scales inside near the base; stamens eight. Fruit a pear-shaped, three-sided, one to three-celled capsule, with thin partitions. Leaves alternate, stipulate, compound, one to three, ternate or pinnate, or decompound; leaflets often toothed, dotted, or lined; petioles often winged. Paullinias thrive in a soil consisting of loam and leaf mould. Propagation is effected by cuttings, made of ripe shoots, and inserted under a

Paullinia—*continued.*

bell glass, in bottom heat. The majority of the species are not worth cultivating, but the two here described will be found desirable subjects for the stove.

P. oceanica (Oceanian). *l.* slender, linear, equally or unequally pinnate; pinnæ sometimes simple, ovate, inciso-dentate, sometimes ternate, with a larger terminal and two smaller lateral leaflets; sometimes there is a slight wing developed upon the rachis near the insertion of the upper pinnæ. Stems dark-coloured. South Sea Islands, 1875. A garden name.

P. thalictrifolia (Thalictrum-leaved). *fl.* very pale pink, ⅛in. in diameter, in small clusters. October. *l.* 4in. to 10in. long, deltoid-ovate in outline, three-ternately-pinnate, pubescent, the main rachis angular, partially flattened or obscurely winged; pinnæ in six to eight pairs, narrow-ovate, the upper ones linear; pinnules four to eight pairs, ⅛in. to ¾in. long. Stem terete, slender; branches velvety-tomentose. *h.* probably many feet. Rio de Janeiro, 1871. A beautiful climber. (B. M. 5879.)

P. t. argentea (silvery). *l.* like those of the type, but suffused with a silvery white. A splendid variety. (B. H. 1880, p. 343.)

PAULOWNIA (named in honour of Anna Paulowna, Princess of the Netherlands, daughter of Paul I., Emperor of Russia). ORD. *Scrophularineæ*. A monotypic genus, the species being a very handsome, hardy, deciduous tree, with the habit of *Catalpa*. It does well in any good soil, and may be increased by cuttings, or by imported seeds, sown in a cold frame; the seedlings should be planted in the open ground when sufficiently large. On account of the dull colour of its downy leaves, and the flowers appearing too early for our climate, the tree is not so much grown as formerly.

FIG. 38. FLOWERING BRANCH OF PAULOWNIA IMPERIALIS.

P. imperialis (Imperial).* *fl.* showy; corolla pale violet, with dark spots on the inside, 1½in. to 2in. long, with an elongated tube, and a five-lobed, spreading limb; panicles terminal, with opposite, many-flowered branches. June. Capsule usually 1in. long, ovoid, acuminate. *l.* opposite, entire or three-lobed, broad, soft, villous or pubescent, 6in. to 12in. long. Branches horizontal, tortuous. *h.* 30ft. Japan, 1840. See Fig. 38. (B. M. 466.)

PAVETTA (the vernacular name of *P. indica* in Malabar). SYNS. *Baconia, Crinita, Verulamia*. ORD. *Rubiaceæ*. A genus comprising about sixty species of glabrous, pubescent, or tomentose, stove or greenhouse, shrubs or small trees, indigenous in the tropics, and also found in South Africa. They are closely allied to *Ixora*, but the lobes of the corolla are twisted in the bud; the style projects for some distance from the corolla, and is terminated by a club-shaped stigma. Flowers white or greenish, disposed in trichotomously-branched corymbs, rarely capitate, often bundle-flowered,

Pavetta—*continued.*

axillary or terminal. **Fruit** fleshy, two-stoned. Leaves opposite, petiolate, usually membranous. The following species are sometimes seen in cultivation. For culture, *see* **Ixora.**

P. borbonica (Bourbon). *l.* opposite, oblong-lanceolate, 6in. to 10in. long; ground colour dark olive green, thickly studded all over the surface with white spots, which are shaded with a very light green; midrib bright salmon-red. Stem erect and usually simple. Isle of Bourbon. A very ornamental-leaved, stove plant, respecting which the "Gardeners' Chronicle" remarks: "*Pavetta borbonica* is a nursery name for a distinct and beautiful plant frequently found in gardens, of which no identification has yet been possible, because, so far as known, no flowers have been produced in cultivation."

P. caffra (Caffrarian). *fl.* white, sub-umbellate; corymbs terminating in short branches. June to August. *l.* obovate, almost sessile, glabrous. *h.* 3ft. to 4ft. Cape of Good Hope, 1823. A beautiful greenhouse shrub when in flower. SYN. *P. corymbosa.* (B. M. 3580.)

Pavetta—*continued.*

P. corymbosa (corymbose). A synonym of *P. caffra.*

P. indica (Indian). *fl.* white; panicle terminal, sub-corymbose, with opposite branches. August to October. *l.* oval-oblong, acuminate at both ends, petiolate. *h.* 3ft. to 4ft. India, &c., 1791. Stove shrub. (B. R. 198.)

PAVIA (named in honour of Peter Paiv, a Dutch botanist, professor at Leyden in the seventeenth century). Buckeye; Smooth-fruited Horse Chestnut. ORD. *Sapindaceæ.* A small genus of hardy, deciduous trees and shrubs, included, by Bentham and Hooker, under *Æsculus.* Calyx tubular; petals four, erect, narrow; stamens straight. Capsules unarmed. Leaves petiolulate. For culture, *see* **Æsculus.**

FIG. 39. FLOWERING BRANCH, DETACHED LEAF, FLOWER, AND YOUNG FRUIT OF PAVIA CALIFORNICA.

P. alba (white).* *fl.* white, disposed in a very long raceme; stamens six or seven, three times as long as the corolla; claws of the nearly similar petals longer than the obconical calyx. April and May. *l.* composed of five to seven oval-obovate leaflets,

Pavia—*continued.*

tomentose beneath. *h.* 3ft. to 9ft. North America, 1820. Shrub, with stoloniferous roots. SYNS. *P. macrostachya, Æsculus macrostachya* (B. M. 2118), *Æ. parviflora.*

P. californica (Californian).* *fl.* white or pale rose, highly fragrant, covering the dense head of the tree; stamens five to seven; anthers orange-coloured. May. *l.*, leaflets smooth, oblong-lanceolate, acute, obtuse at base, serrulate, with slender petiolules. California. A very handsome species; usually a shrub, 12ft. to 15ft., sometimes a tree, 40ft. high, with a dense head, much more in diameter. See Fig. 39.

P. discolor (discoloured). A synonym of *P. flava purpurascens.*

P. flava (yellow).* Sweet Buckeye. *fl.* pale yellow; stamens included within the four-petaled corolla. May. *l.* on pubescent petioles, which are rather flat above; leaflets five or seven, elliptic-oblong, acute at both ends, pubescent beneath and on the nerves above. *h.* 20ft. North America, 1764. A large tree or shrub. (B. R. 1009, under name of *Æsculus neglecta.*)

P. f. purpurascens (purplish). *fl.* tinged with red or purple. SYNS. *P. discolor, P. hybrida.* (B. R. 310, under name of *Æsculus discolor.*)

P. hybrida (hybrid). A synonym of *P. flava purpurascens.*

P. macrostachya (large-spiked). A synonym of *P. alba.*

FIG. 40. FLOWERING BRANCH OF PAVIA RUBRA.

P. rubra (red). Red Buckeye. *fl.* bright red, disposed in an oblong panicle; stamens shorter than the corolla. May. *l.*, leaflets five, elliptic-oblong, acute at both ends, and, as well as the petioles, glabrous, slightly pilose in the axils of the nerves beneath. *h.* 10ft. North America, 1711. Shrub or small tree. SYN. *Æsculus Pavia.* See Fig. 40. (B. R. 993; W. D. B. 120, 1643.) Of this, there are three varieties: *humilis*, 6ft. high; *pendula*, with pendulous branches; and *laciniata*, with deeply cut leaves.

PAVONIA (named after Don Jose Pavon, a Spanish traveller in Peru, one of the authors of "Flora Peruviana et Chilensis"; he died in 1844). Including *Lebretonia* and *Lopimia.* ORD. *Malvaceæ.* A genus comprising upwards of sixty species of tomentose, hispid, or glabrescent, stove herbs or shrubs. Ten or eleven are natives of Africa, tropical Asia, or the Pacific Islands; the rest are all indigenous to South America or the warmer parts of North America, one of the South American species being also found in Australia. Flowers of various colours, pedunculate or in congested heads at the apices of the branches; calyx five-fid or five-toothed; petals spreading or convolute-connivent. Leaves often angular or lobed. Few of the species have any horticultural value. They thrive in any light, rich soil. Cuttings will root readily if inserted in sand, under a glass; increase may also be effected by seeds. All the under-mentioned species are shrubs.

Pavonia—*continued.*

P. malacophylla (soft-leaved). *fl.* scarlet, axillary, solitary or crowded at the tips of the branches; corolla flat. February. *l.* orbicular, cordate, coarsely toothed. *h.* 4ft. New Grenada, 1823. (B. M. 4365, under name of *Lopimia malacophylla.*)

P. multiflora (many-flowered).* *fl.* solitary in the upper axils, and forming a short, terminal corymb; bracteoles red, hairy, numerous below the flower, whorled, longer and narrower than the purplish calyx segments; petals dull purple, 1in. to 1½in. long, rolled together, narrowly obovate-oblong. September. *l.* alternate, 6in. to 10in. long, 1½in. to 2in. broad, narrowly oblong, or obovate-lanceolate, long-acuminate, serrulate or denticulate; petioles 1½in. to 3in. long. Brazil. A robust plant. (B. M. 6398.)

P. Schrankii (Schrank's). *fl.* on solitary, axillary peduncles; corolla orange-coloured, yellow at base, above 1½in. long, 2in. across; petals imbricated and convolute. July. *l.* scattered, spreading wide, 3½in. long, 1½in. broad, ovate, sub-cordate at base, acuminate. Branches erect. *h.* 2ft. Brazil, 1823. (B. M. 3692.) SYN. *Lebretonia coccinea.*

P. Spinifex (prickly-fruited). *fl.* yellow; pedicels axillary, one-flowered. July and August. *l.* ovate, acuminate, almost cordate, doubly toothed. Warm parts of America, 1778. (B. R. 339.)

P. Makoyana and *P. Wioti* (B. H., 1875, vii.) are species of *Goethea.*

PAVONIA (of Ruiz and Pavon). A synonym of **Laurelia** (which *see*).

PAXTONIA. Included under **Spathoglottis** (which *see*).

PEA. A common name for various members of the *Papilionaceæ* family.

PEA (*Pisum sativum*). A hardy annual, one of the most valuable and best known of leguminous plants, and one which has been in cultivation from remote antiquity. Its origin is unknown; probably, however, the early home of the species was Western Asia. It is supposed to have been introduced into this country from the South of Europe, about the time of Henry VIII. The uses to which the seeds are put, as an article of food, both in a young, green state, and after being matured and dried, are familiar to everyone. Used in either way, they are very nutritious. Dried Peas, in days long past, formed a more important article of food than at the present time, especially amongst the working classes. They have been replaced very considerably by Potatoes since the cultivation of that vegetable has become so generally adopted. It is to the production and supply of green Peas that cultivators now more particularly devote their attention, and a continued succession of crops becomes necessary in order to maintain an unbroken supply. Green Peas, very early in the season, are justly considered a great delicacy, and gardeners vie with each other in using every means in their power to supply a dish as early as possible. To this end, it is important that only suitable early varieties be grown, and that they should receive more than ordinary attention in spring, and until their produce is fit to gather. Mid-season and late varieties bear longer in succession than early ones, and various heights also make considerable difference respecting the time taken in perfecting their crops.

CULTIVATION. The Pea crop is best provided for by a rich, loamy soil, amongst which plenty of calcareous matter, such as lime, chalk, &c., should be incorporated. It should be of a good depth, in order that the roots may penetrate for a supply of moisture, should the surface become dry. This is of great importance in summer, as then the plants require plenty of moisture, and if the supply is insufficient, mildew invariably attacks the leaves, and the pods rarely fill satisfactorily. Manure is best suited for Peas when applied to a previous crop; should ground of such a description be unavailable, or the position unsuitable, it would be best to thoroughly trench, and add horse, or ordinary farmyard, manure at about 1ft.

Pea—*continued.*

beneath the surface. Some cultivators prepare trenches, in which such manure is laid at the bottom, and covered in with the soil previously taken out. For main and late crops, this plan has been found very successful, because by it the roots are provided with an extra amount of nutriment and moisture at a time when they most require it. Efficient drainage is, however, important, and the surface should be kept open for the reception of all the rainwater available. The treatment varies somewhat with the seasons, the time when the seeds of successional crops are sown, and when they are intended to come to perfection. For the earliest supply, a warm, rather lighter soil, and a more sheltered position, are requisite, compared with what is suitable later in the season. Drills for Peas should be drawn flat and rather wide, say 6in. at the bottom, and at a uniform depth of about 2½in., or a little deeper for large-seeded kinds. When sown in autumn, too, a greater depth is recommended than for spring; but the soil filled in should first be rendered somewhat fine, in order that the young seedlings may readily find their way through it. If the seeds are good, they should not be sown too thickly, particularly the strong-growing, late sorts. As a general guide, a pint of good seed of an early or medium-growing Pea should sow from twelve to fifteen yards run, a similar quantity of a late sort being equalised over a further length of about ten yards; provided that, in either case, most of the seeds are likely to grow. The distance apart for the rows depends on the height to which the variety is expected to grow, and the space available. Rows of Peas, sown some distance from each other, and the intervening space occupied with another crop, is an excellent system, much practised, with the result that a more abundant yield is obtained than when the rows are very near each other. This plan does not, however, answer so well for early supplies, because the necessary shelter would not be insured. For these, a sunny south border is requisite, and, in order to subject each row to an equal amount of sunshine, and also utilise the whole border, so far as the quantity of seed reaches, it is generally most convenient to sow in an oblique direction across the border, allowing the lines to run in the direction from south-east to north-west, the space allowed between each two rows being about equal to the estimated height that the sort of Peas sown will reach. When Peas are provided with sticks on which to climb, as is usually the case with those grown in gardens, it is very important that the plants should not be allowed to fall about or become bent before the sticks are inserted, else they seldom take hold properly. Earthing-up should first be practised, lightly, when the seedlings are a little above ground, and again before the sticks are inserted. When dwarf sorts are cultivated, and allowed to grow on the ground—a plan not in any case recommended, except for field or market-garden culture on a large scale—the earth should be drawn more to one side than the other, in order to encourage all the plants to turn in one (the opposite) direction.

The seeds of Peas require some protection against the depredations of mice; otherwise, they are in danger of being entirely demolished even before germination takes place. To prevent this, various plans have been devised. Some merely cover the seeds of early sowings with a little good soil, and then with, say, 2in. of sharp sand or sifted coal ashes, these substances not being readily burrowed into by mice. As a preventive, the seeds should always be placed in a little sweet oil, and afterwards covered with dry red lead, which will then adhere to their surface; powdered resin has also been recommended for use in a somewhat similar way. For other methods of lessening the harm done by mice, *see* **Mice.** Small birds are very destructive to the young plants when they are just issuing from the ground, by clipping off a great part, or sometimes the whole, of their heads. Pea-guards,

Pea—*continued.*

made by fixing ordinary wire netting on a framework with semi-circular iron hoops attached, are most useful for placing over the rows until danger is past. Failing these, small black threads, fixed a couple of inches above the young plants, and stretched as tightly as the material admits, will often prove an effectual preserver. The smaller and more invisible such threads are, the better, as, if they are large enough to be easily seen, small birds pass under them unscared, and carry on their disastrous practices underneath. In some localities, particularly near shrubberies and large trees, birds are very destructive to the Pea crop when it begins to be fit for gathering. Numerous plans are adopted for lessening the amount of destruction by scaring the birds, but it is seldom altogether prevented when once commenced, except by covering the whole with netting; this is usually kept at a fair distance off by the Pea-sticks themselves. An occasional discharge of a gun has also proved instrumental in warding off such unwelcome visitors amongst green Peas as hawfinches, blue tits, and sparrows.

Earliest Crops. In gardens generally, some time during the month of May is as early as a gathering of green Peas can be expected, and not unfrequently, in an unfavourable season, June has considerably advanced before many dishes are procurable. As before stated, great attention is accorded to early Pea culture, but, at times, the very earliest crops are exceedingly precarious. There are many methods of forwarding and protecting; but, first of all, it is imperative that only suitable early sorts must be sown. Dwarf Peas are sometimes forced in large pots under glass, but the system is scarcely worth pursuing, except for the possibility of securing a satisfactory result, the latter being by no means certain. Nothing approaching a high temperature should be allowed, nor must a close atmosphere be permitted. Failure is not unfrequent, in consequence of the flowers failing to set in winter time. In spring, some pots might be utilised, and an early—though very limited—supply obtained in advance of any from outside. Forcing of Peas under glass must not be attempted before the pods are set; they will not withstand anything beyond forwarding in a cool, airy, and light situation. For earliest crops outside, a south border, duly sheltered by a high wall, or fence, may be selected, the ground prepared, and seeds sown about the middle of November. With a view to providing for mishaps through winter, it is advisable to sow more thickly at this season than has been already recommended. As the young plants appear, some of the earth on either side should be drawn up to form a slight ridge, which should be increased in height by a similar process when a little more growth has been made. Shelter must also be afforded, especially on the northern side, by the insertion of short sticks, or branches of evergreens. Young Pea-plants will, under certain circumstances, bear considerable frost without injury, but they can ill withstand a cutting wind. In very severe weather, a light covering of dry bracken, or similar material, should be thrown over them to prevent the ground becoming much frozen. Staking affords of itself a great amount of shelter, and should be attended to so soon as the plants are sufficiently high. A few evergreen branches will still prove valuable on the more exposed sides of the rows. Should this sowing succeed, and make satisfactory progress, the spaces between the rows should be deeply hoed early in spring, when the surface is in a fairly dry condition, and has become somewhat warmed by sunshine. Another sowing should be made in January, should weather and circumstances permit, and still an equally well-sheltered situation should be chosen. It not unfrequently happens, in a favourable spring, that this sowing nearly overtakes that sown in autumn by the

Pea—*continued.*

time the produce is fit for gathering. Still, a few days are then generally considered of great importance. Where space and plenty of 4in. pots are available, it is a tolerably common practice to sow under glass early in February, with the intention of transplanting outside in March. Half-fill the pots with any fairly rich soil, scatter from eight to twelve seeds over the surface, then fill up with soil, and stand the pots in a cold frame, where air may be admitted on all favourable occasions. Treated in this way, the plants become much sturdier than when artificial heat is applied, and may be eventually planted out with a far greater chance of success. Favourable weather should be selected for transferring them outside, and, in planting, the balls may be inserted intact, or gently pulled in halves, and the latter planted separately. A warm position is necessary for Peas thus started at the commencement; earthing-up and protection are also essential so soon as they are planted out. Young seedling Peas transplant readily; consequently, it is advisable to fill up blanks, and make rows good, so far as the stock at command admits.

Successional and Main Crops. Once the supply of green Peas is commenced, it is most important that it should be kept up so far as possible. To this end, varieties, differing in height and description, and successional sowings, must, collectively, be made to contribute. Successional sowings of one sort during the two first months of the year and part of March will, as a rule, vary but little in the time of bearing, whereas if three or four sorts, varying in height and other particulars, are sown at the same time, a succession in bearing is more likely to be assured. From the end of March until June, sowings for main crops should be made at intervals of about three weeks, according to locality, and other circumstances not under control. Some make a sort of rule to sow again when the previous sowing is just appearing above ground; but this is not always a certain guide, as the weather would have a variable effect in different seasons and localities. For successional and main crop Peas, a position in one of the best parts of the garden quarters should be reserved, and the ground previously prepared, if unfit for their requirements. The drills for these should proceed in a direction from north to south. When earthing-up, the soil should be drawn just up to the plants, and left in a ridge on either side, with a view to retaining all rain or other water, instead of allowing any to run off.

Late Crops. To continue the succession into autumn, and maintain a supply, is not always an easy matter; still, it is very important that every attempt at doing so should be made. Strong-growing, tall and dwarf Marrow Peas are best suited for the purpose; and the trench system, with manure placed beneath, in the way already described, is the best method of cultivation. The great cause of failure is mildew on the plants, and this may be considerably prevented by providing a good depth of soil, and plenty of moisture beneath, where the roots penetrate. A mulching of rotten manure is of material help in preventing evaporation; it should be about 3in. deep, and laid on the surface for 1ft. or more on each side of the rows. In favoured localities, sowings for late crops may be made from the middle till the end of June; but, in northern parts, the beginning of June is sufficiently late for allowing the plants to blossom and bear anything like a crop. Some cultivators sow second early sorts late in the season, because of the likelihood of their turning in more quickly; but the plants lack the strength of late kinds, and the produce is also much inferior in quality. Tall sorts, grown late, should be stopped when about 4ft. high, in order to promote fruitfulness at an earlier stage than would be likely under ordinary circumstances. A sowing of late

Pea—*continued.*

sorts should also be made, first in April, and secondly in May.

All Peas are benefited by an occasional dressing of soot and a little lime on the surface, previous to and at the time when they are pushing through the ground. It tends greatly to ward off slugs, and is by no means agreeable to birds and mice. Should watering become necessary in summer, a thorough soaking should be given, and this applied at too late a stage is but of little use. When gathering Peas for use, only such as are fit should be selected, the whole stock of one sort being looked over each time, in preference to picking a portion severely, and leaving others alone possibly to become too old. Pea-sticks should be as strong and thin in proportion as may be procurable, and used at about the heights different sorts are calculated to reach. They should be firmly inserted in a slanting direction, the set

FIG. 41. GARDEN VARIETY OF PEA (*Pisum sativum*), with Flowers and Pods in different stages of development.

on one side pointing in an opposite direction to the other, yet at about the same angle. The leaf-tendrils clasp and retain a firmer hold on sticks thus arranged than they do on others inserted vertically. A few small branches near the base are instrumental in assisting the plants to commence climbing.

SORTS. Varieties of Peas are become exceedingly numerous, and several new ones are still annually put into commerce. Few vegetables have been so greatly improved during the last few years as Peas, particularly in the direction of introducing the superior-flavoured Marrows amongst the earlier sorts that were originally all small and round-seeded. There are different methods adopted for arranging Peas in classes for reference and distinction. Formerly, the smooth or round-seeded kinds were far more numerous than those with wrinkled seeds; now they are nearly equally represented. White,

Pea—*continued.*

green, and blue wrinkled Marrows are severally distinguished by their dried seeds being compressed, wrinkled, and of the colours given. Sorts with their dried seeds round or roundish in shape are mostly either white or blue; in some, they are small, with thin skins; others are large, and have thick skins. Peas retain their germinative powers for three years, some sorts for a longer period. Wrinkled seeds do not germinate so readily as round ones, nor do they keep good so long. The habit of growth and mode of bearing which Peas assume is represented in Fig. 41. Respecting the periods when sorts which are sown at different times may generally be expected to produce their crops, much depends on the season, locality, soil, and various other circumstances. The earliest round Peas, sown in autumn, or very early in January, may be expected to be ready by about the end of May; others, sown in January and February, should follow about the middle of June. Dwarf Marrows, sown during the early part of March, should come in early in July; and sowings of tall Marrows, made in succession from about the beginning of April, should similarly succeed each other in bearing from the middle of July onwards. Subjoined is a limited selection from amongst the principal sorts in cultivation, arranged for convenience according to the different seasons in which they come in bearing. An asterisk denotes a sort specially recommended.

Earliest Sorts.

Alpha (Laxton's).* Wrinkled blue Marrow. Pods produced singly, occasionally in pairs, long, narrow, much curved and pointed, each containing from six to nine good-sized peas, of fine quality. *h.* 3ft. to 3½ft. One of the best early wrinkled Marrows.

American Wonder.* Wrinkled Marrow. Pods produced singly or in pairs, about 2in. long, straight, well-filled. *h.* 9in. to 12in. An excellent first-early variety, of compact habit and fine flavour.

Beck's Gem. Seeds round, white, smooth. Pods generally in pairs, straight, nearly round, containing about six tolerably large peas. *h.* seldom exceeding 1ft. Very prolific.

Blue Prussian. Seeds round, light blue, smooth. Pods mostly in pairs, seldom solitary, about 3½in. long. *h.* 3ft. to 3½ft. An old, very prolific variety, grown extensively for market.

Daniel O'Rourke.* Seeds round, white, smooth. Pods straight, solitary, generally from eight to ten on a plant; peas rather large. *h.* 2ft. to 2½ft. A well-known early variety, sometimes called SANGSTER'S NO. 1.

Dr. Hogg.* Wrinkled green Marrow. Pods borne singly or in pairs, long, much curved, containing from seven to nine large peas, of excellent quality. *h.* 3½ft. to 4ft. One of the earliest wrinkled Marrows.

Earliest of All (Laxton's). Seeds round, blue. Pods produced in pairs. *h.* 2ft. to 2½ft. A heavy cropper, of excellent quality. The earliest round blue variety.

Early Dwarf Frame. Seeds round, white, smooth. Pods mostly solitary, about 2in. long, slender. *h.* about 10in. A dwarf, productive variety, suited for culture in frames.

Early Frame. Seeds small, very round, white. Pods straight, well filled, generally containing six peas in each, of excellent quality. *h.* 3ft. to 3½ft. An early, hardy variety, with numerous synonyms.

Early Sunrise (Day's).* White wrinkled Marrow. Pods long, nearly straight; peas large for an early variety. *h.* 2½ft. to 3ft. Compact, bushy habit; hardy, and very prolific.

Maclean's Blue Peter. Seeds round, blue. Pods sometimes single, sometimes in pairs, rather over 2in. in length, each containing from six to eight very large peas. *h.* not exceeding 1½ft. A very dwarf variety, with dark green foliage. A few days later than the EARLY DWARF FRAME.

Maclean's Little Gem.* Green wrinkled Marrow. Pods produced in pairs, broadish, nearly straight, well filled. *h.* 1ft. to 1½ft. An excellent cropper, dwarf, very early, and of good quality. Fine for forcing.

Ringleader.* • Seeds round, white, smooth. Pods straight, usually solitary, each containing six or seven peas. *h.* 2½ft. to 3ft. Habit slender. This is considered one of the best early smooth Peas for outside culture, and is rather a remarkable variety, inasmuch as the first flowers either do not expand properly, or remain until those above are also ready to open. The flowering and bearing seasons are thus limited, the whole crop turning in nearly at once. A good early sort, extensively cultivated; also known as CARTER'S FIRST CROP. DICKSON'S FIRST AND BEST is rather larger, and perhaps more productive, than RINGLEADER; it is, however, much like it, but a few days later.

Pea—*continued.*

William the First.* Smooth, green-seeded Marrow. Pods borne singly and in pairs, nearly 3in. long, narrow, curved at the point; they are deep green, covered with a thick bloom, and each contains from seven to nine good-sized peas, of excellent flavour. *h.* 4ft. to 5ft. An exceedingly valuable variety; one of the earliest and best Marrows.

Second Early and Main Crop.

Advancer (Maclean's).* Wrinkled blue Marrow. Pods generally in pairs, slightly curved, containing about eight very large, compressed peas, which are of first-class quality. *h.* 2ft. to 2½ft. An excellent early Marrow, which turns in a few days after Laxton's ALPHA.

Champion of England.* Wrinkled blue Marrow. Pods sometimes solitary, but generally produced in pairs, long, slightly curved and flattened, each containing from six to nine peas, closely packed and compressed. *h.* 5ft. to 6ft. A strong-growing, abundant-bearing, climbing Pea, of great excellence; one of the best for general use.

Dickson's Favourite. Seeds round, smooth-skinned. Pods generally in pairs, medium-sized, long, well filled. *h.* 4ft. to 5ft. An abundant bearer and good sort.

Dr. Maclean.* Blue wrinkled Marrow. Pods very large, handsome, well filled with about nine very large peas of excellent quality. *h.* 3½ft. to 4ft. One of the finest wrinkled Marrows, coming in after ADVANCER. Very robust in habit.

Duke of Albany. Wrinkled green Marrow. Pods usually produced in pairs, nearly 4in. long, straight, very thick, well filled with about ten large peas. *h.* 5ft. to 6ft. Vigorous growing and productive.

Fillbasket (Laxton's). Seeds round, light green when ripe. Pods generally in pairs, very long, curved and pointed at the end, closely filled with from seven to nine good-sized peas. *h.* 3ft. Of vigorous growth, with branched stems and distinct, large, yellowish-green leaves.

G. F. Wilson (Carter's).* Wrinkled blue Marrow. Pods borne singly and in pairs, large, nearly straight, from 2in. to 3in. long, usually containing not more than from six to eight peas, which are, however, very large, oblong, and somewhat flattened. *h.* 4ft. An excellent cropper, of robust habit.

Gladiator.* Wrinkled Marrow. Handsome pods, produced in pairs, long, curved, closely filled with medium-sized, deep green peas, of excellent quality. *h.* 3ft. A remarkably prolific and distinct main crop variety. Plant of robust, vigorous habit.

Maclean's Wonderful. Wrinkled Marrow. *h.* 3ft. A productive variety, with large pods; good cropper, and of excellent flavour.

Marvel (Laxton's).* Wrinkled white Marrow. Pods produced singly and in pairs, large, much curved, and pointed, containing from seven to nine large peas, which are very green. *h.* 3ft. An excellent and productive main crop variety, of fine quality.

Prodigy. Green wrinkled Marrow. Pods generally in pairs, nearly straight, extra long and broad, each containing about ten large peas, of excellent quality and flavour. *h.* about 5ft. Plant robust, vigorous, branching; said to be very productive. A fine new variety, sent out in 1886.

Stratagem (Carter's).* Wrinkled Marrow. Pods of enormous size, and sometimes upwards of 6in. in length, each containing from nine to eleven very large peas. *l.* dark green. *h.* 2ft. to 2½ft. Habit robust. One of the best dwarf, wrinkled Marrows in cultivation.

Supreme (Laxton's).* Smooth, green-seeded Marrow. Pods from 3in. to 3½in. in length, straight, with an abruptly curved point, well filled; peas large, and of fine flavour. *h.* 4ft. to 5ft. A hardy and productive second early variety. The pods swell to an unusual size in advance of the peas, which causes them to appear ready for gathering long before they really are.

Telegraph (Culverwell's).* Wrinkled Marrow. Pods very numerous, long, broad. Peas large, nine to eleven in a pod, of a fine deep green colour and excellent flavour when cooked. *h.* 5ft. to 6ft. An excellent, well-known sort, of robust habit.

Telephone (Carter's).* Wrinkled Marrow. Pods solitary or in pairs, very large and broad, each containing from eight to eleven large peas, of first-rate quality. *h.* 5ft. to 6ft. A splendid wrinkled variety, selected from CULVERWELL'S TELEGRAPH. One of the finest second early sorts.

Veitch's Perfection.* Wrinkled blue Marrow. Pods large, usually borne in pairs, straight, containing seven or eight large, compressed peas, of superior quality. *h.* 3ft. An excellent cropper; highly esteemed as being one of the best sorts.

Late Crop.

British Queen.* Wrinkled white Marrow. Pods usually in pairs, very long and nearly straight, each containing about eight very large, tender peas. *h.* about 6ft. Plant of vigorous growth and branching habit. A good late sort.

Culverwell's Giant Marrow.* Blue wrinkled Marrow. Pods immense, broad, and upwards of 7in. long, well filled with large peas, of finest quality. *h.* 5ft. to 6ft. Exceedingly productive and fine.

Pea—*continued.*

King of the Marrows. Wrinkled green Marrow. Pods generally in pairs, broad, from 2in. to 3in. long, containing from six to eight large, oblong peas. *h.* 6ft. to 6½ft. One of the very latest and tallest-growing sorts.

Maclean's Best of All. Wrinkled green Marrow. Pods produced in pairs, over 3in. long, broad, gradually narrowed at both ends. They contain from five to eight large peas in each, but are not regularly filled. *h.* about 3ft. A rather late sort, productive, and of good quality.

Ne Plus Ultra.* Wrinkled green Marrow. Pods nearly always in pairs, fine dark glaucous green, curved, narrowed towards the stalk; peas very large, from seven to nine in a pod, of first-rate quality. *h.* from 6ft. to 7ft. An abundant bearer, and one of the best late Peas in cultivation.

Omega (Laxton's).* Wrinkled green Marrow. Pods usually in pairs, long, narrow, very closely filled with from eight to ten very large, dark green peas, of excellent quality. *h.* about 2½ft. Very prolific. This might be termed a dwarf NE PLUS ULTRA.

Prizetaker Green Marrow. Smooth, green-seeded Marrow. Pods nearly 3½in. long, slightly curved, of a deep bluish-green, covered with thick bloom. Each pod contains from six to ten large peas, which become misshapen from being compressed. *h.* 4ft. to 5ft.

Sturdy (Laxton's).* Wrinkled green Marrow. Pods produced in pairs, long, nearly straight, containing from six to nine large, dark green peas, of excellent quality. *h.* about 3ft. One of the latest sorts, robust, strong growing, much branched.

EDIBLE-PODDED OR SUGAR PEAS. All the sorts of Peas that have been already noticed are grown in gardens, principally for the use of their produce in a young or green state. They are termed Shelling Peas, and the pods are of no use when once their contents are extracted, because they are lined with a hard and tough, stringy membrane, which renders them unfit for food. In the other class, now under notice, the pods are usually destitute of this stringy substance, and readily snap, like those of Kidney Beans. If prepared and cooked, when young, in a similar way to the last-named vegetable, they are considered to form an excellent dish, one which is more appreciated on the Continent than in this country. Edible-podded Peas are not much cultivated in Britain; not so extensively, perhaps, as their merits deserve. Subjoined are the names of a few sorts.

Butter Pea. Pods from 2in. to 2½in. long, produced singly, and in pairs, deeply curved; the sides are very fleshy, thick, and succulent. *h.* 3ft. to 4ft.

Dwarf Dutch. Pods often solitary, narrow, crooked, thick, and fleshy; seeds white, large, from five to seven in a pod. A very dwarf variety.

Early Dwarf Brittany.* Pods generally in pairs, about 2in. long, narrow, fleshy, quite free from membrane. *h.* about 2½ft.

Forty Days' Edible-Podded. Pods generally in pairs, straight, free from membrane; peas medium-sized, slightly compressed, white when ripe. *h.* about 4ft. A climbing variety, which produces its flowers over a long period.

Giant Sugar Pea.* Pods sometimes 6in. in length, larger than those of any variety of this class, much twisted; peas large, distinctly seen from the outside of the pod. *h.* 4ft. to 5ft. Should be used when young.

Large Crooked Sugar Pea.* Pods very large, sometimes 5in. long, broad, often crooked, free from membrane, and exceedingly tender when young. *h.* about 5ft. One of the best sorts, more extensively grown than any of the others.

FUNGI. The Fungi parasitic on Peas are chiefly two species, which resemble each other in forming whitish coatings on the leaves and other parts of the plants; but they are not difficult to distinguish, even with the unaided eye. In both, the whitish coat is formed of rows of cells, forming threads too slender to be seen distinctly, even with a lens. Both belong to the forms included under the general name of **Mildew** (which *see*); but they represent widely different groups of Fungi. *Erysiphe Martii* (Pea Mildew) is the commoner of the two. It possesses conidia of the type described under **Oidium** and also spores in asci which lie in the perithecia. The plants are, at times, wholly covered with this Fungus, and the result is stoppage of their growth, and loss of the seeds. Unfortunately, this

Pea—*continued.*

Fungus grows on many other plants also, so that it can hardly be exterminated from gardens. *Peronospora Viciæ* (Pea Mould) is more plentiful on Tares than on Peas. On both, it grows on the lower surface of the leaves; and it differs from the Pea Mildew in sending its filaments through the Pea's tissues, thus living inside the host-plant. It differs also in the reproductive processes. The conidia are of the kind described under **Peronospora**; and so also are the *resting*, or sexually mature, spores. The latter are formed within the tissues of the Peas, and serve to reproduce the Fungus in the following spring. Plants attacked by this Fungus are pierced by it in all directions, though only the branches that bear conidia are to be seen on the outer surface of the host-plant. The diseased tissues become brown, and ultimately rotten, and fall to pieces. *P. Viciæ* appears in early summer; it attacks many leguminous plants. Remedies should be directed rather to insure prevention of injury to subsequent crops than in trying to save those plants already diseased. All refuse, especially Pea stalks, and other rubbish of that nature, must be collected and burned, to prevent the diseases being transmitted by such means from the crop of one year to that of the next. The remedies recommended under **Mildew** and **Oidium** would help to check Pea Mildew (which is quite superficial in its growth), but would not be of any use for Pea Mould.

Peas, along with Beans and Vetches, are also subject to the attacks of Pea and Bean Rust (*Uromyces appendiculatus*, var. *Pisi*). Plants diseased from this cause assume a dull, rusty-brown hue, which, in bad attacks, may almost conceal the green of the leaves, but usually only modifies it more or less. This colour is due to very numerous, small, rust-coloured spots, distributed over the surface, none of them usually exceeding $\frac{1}{16}$in. across; though, occasionally, two or more may meet, and join into one spot. Under the microscope, the spots are seen to be made up of a crowded mass of minute, egg-shaped cells, of a rusty-brown colour, each supported on a long, slender stalk. These cells are the spores of the Fungus, and ripen towards the end of summer, or in autumn. In spring, each pushes out a blunt, slender tube, on which form three or four very small sporidia; and these, if they fall on a suitable food-plant, push a tube into it. This tube branches and spreads through the tissues, and forms, in turn, new spots of spores bursting through the epidermis, or skin, of the leaf. It is believed, by some botanists, that this Fungus appears also in another form on one of the Spurges, *Euphorbia Cyparissias*. Plants attacked by Rust should be burned as soon as possible, to prevent the disease from spreading. The position of the mycelium in the tissues of the host-plants renders any direct means of destroying the Fungus hopeless, without involving the host-plant in the demolition. Such plants as favour its spread, and give it support, *e.g.*, Vetches, should be kept as far from the Pea crop as possible.

INSECT PESTS. The Pea is exposed to the attacks of not a few insects. Some of these injure the leaves and the young stems; others feed in the fruit, eating the Peas, either while young and soft, or after they have been stored in the granary, and leaving them mere hollow shells, pierced at one side with a hole. The seeds are frequently damaged by Millipedes (*see* **Myriapoda**) while they are sprouting, especially in wet seasons, and, like all garden produce, they are eaten by slugs and snails. Among their worst foes are the Pea and Bean Weevils (*see* **Sitona**), which, as beetles, gnaw the leaflets, leaving the margins notched; or the whole leaflet is more or less completely eaten away. In very bad attacks, the whole crop may be destroyed. These beetles also feed on Beans, Clover, Lucern, and other leguminous plants. The most hurtful species are the Striped Pea Weevil

PHALAENOPSIS

Pea—*continued.*

S. lineata), and the Spotted Pea Weevil (*S. crinita*). They are about ⅛in. long, elliptical, black, covered with minute scales, which are clay-coloured, rosy-greyish, or whitish; the beak is short and stout; and the wing-covers bear ten lines of minute pits from end to end. *S. crinita* may be known by having short bristles on the wing-covers behind, and by its slightly smaller size. These insects feed during the day, but are readily overlooked, since, when alarmed, they at once fall from the plants to the earth. They begin their ravages even in March, and may be met with throughout the summer.

The larvæ of several kinds of moths are destructive to Pea-plants, as well as to other garden produce (*see* **Mamestra, Plusia,** and **Potherb Moths**). The larvæ of a small fly (*see* **Phytomyza**) burrow between the surfaces of the leaf, and make winding, white tracks, in which they change to pupæ, and thereafter into flies; but these mines can scarcely be said to weaken the plants.

The roots are liable to be eaten by larvæ that live underground (*see* **Noctua** and **Wireworms**). The young shoots and branches are occasionally smothered, or nearly so, by swarms of Green Fly (*see* **Aphides**), usually of the species *Siphonophora Pisi* and *Aphis Papaveris*.

Bees, but more particularly **Humble Bees** (which *see*), at times, do considerable harm, by boring holes, from which to suck the honey, without effecting the fertilisation of the ovules by transferring pollen from flower to flower.

The larvæ of a tiny midge (*Cecidomyia Pisi*) may, at times, be found feeding, in large numbers, in the young pods, eating the unripe Peas, and causing the pods to be spotted with yellow. The larvæ are white, and reach about ⅓in. in length. They bore out of the pods, when full-fed, fall to the ground, and become pupæ in the earth.

The larvæ of certain beetles, and of two or three moths, feed on the seeds in pods approaching ripeness, as well as in dried Peas. The more noteworthy are: *Tychius quinque-punctatus* and *Bruchus Pisi* and *B. granarius* among beetles; and *Grapholitha pisana*, Guen. (*Endopisa proximana* of Stainton's "Manual"), and, to a less extent, *Endopisa nigricana* (of the same "Manual") among the moths.

Tychius quinque-punctatus is a Weevil about ⅛in. long, elongate-ovate; the beak tapers from base to tip, is rather long, and curves downwards; the colour is black, covered with coppery-red scales. The lower surface is pure white; the thorax is rounded, the thighs rather thick, toothed, and black; the rest of the legs, and the antennæ, dull red. The beetles appear in late autumn, live through the winter, and in spring and early summer lay eggs in the young pods of various *Leguminosæ*. The larvæ feed in the pods. They are yellowish-white and smooth. When full-fed, they fall to the ground, and become pupæ in the soil.

The *Bruchidæ* differ from Weevils in having the beak short, broad, and flattened, the antennæ straight and gradually becoming thicker, the wing-cases shorter than the abdomen, and the hind legs long and strong. *B. Pisi*

FIG. 42. BRUCHUS PISI, showing the Beetle of the natural size (*a*) and enlarged (*b*), and a Pea (*c*) in which the hole of exit is seen on one side.

(see Fig. 42) is about ¼in. long, oval, black, with a dense coat of silky hairs, which are bright brown above, paler beneath; thorax variegated with orange hairs; lateral

Pea—*continued.*

teeth white; wing-cases striated, with some paler spots and obscure streaks; tarsi and tibiæ, in parts, and four basal joints of antennæ dull red. This beetle has been most injurious in Southern Europe. It is believed to be a native of North America. Though often imported with Peas, it has not fully established itself anywhere in Britain. The beetles pair while the Peas are in flower; and the females deposit their eggs in the Peas, in which the larvæ live all winter, hollowing them out; finally becoming perfect beetles, and boring out from them in the ensuing spring and summer. *B. granarius* is slightly smaller than *B. Pisi*, but is otherwise much like that species, though with a thinner coat of hair. The teeth on the sides of the thorax are less distinct; and there are white dots on the back. The wing-cases are sprinkled with whitish hairs, and there is a brown stripe near the base of the wing-cases. The first pair of legs, and the four basal joints of the antennæ, are pale red; and the second and third pairs of legs are dark throughout. *B. granarius* is common in Peas, and also in pods of Beans, Broom, Furze, and Vetches. In habits, it is much like *B. Pisi*. It has been asserted that Peas and Beans containing the larvæ injure the health of persons, and of domestic animals, who partake of them.

The moths hurtful, in the larval state, to Peas are included in the great group of **Tortricina** (which *see*), and are now referred to the genus *Grapholitha*, though Stainton, in his "Manual," includes them in the genus *Endopisa*. Of these, the most common is the Pea Moth (*G. pisana*, Guen. = *Endopisa proximana* of Stainton's "Manual"). This insect measures about ½in. across the front wings, which are olive-brown in colour, with a row of short, pale yellowish lines along the front margin, directed backwards. Near the hind margin is a silvery ring, inclosing a spot in which are three or four short, black lines. The moths fly in June; they lay eggs on the young pods, and the larvæ bore into the pods to reach the seeds. When full-fed, they are about ¼in. long, rather stout, and yellowish, with a black head, and brown dots on the rings. They eat their way out of the seeds when full-fed, and creep underground to become pupæ. The moths appear in the following June. Nearly allied to this species is another, *G. tenebrosana*, Dp. (*E. nigricana* of Stainton), which differs in its darker brown ground-colour, and only faintly yellowish tip; in its whitish and pale yellow scales, scattered over the wings; and in the spot near the hind margin being very little yellower than the rest, and inclosing mere dots instead of streaks. The larva of this species also feeds in Peas.

Remedies. These differ with the habits of the various insects, and other foes. For measures to get rid of Millipedes, *see* **Millipedes** and **Myriapoda**; and *see also* **Slugs** and **Snails** for remedies against the attacks of those creatures.

The Pea Weevils (*Sitona lineata* and *S. crinita*) may be best prevented from doing serious damage by using all means to promote the rapid growth of the plants, as they are thus protected against the loss of all their leaves. Good soil, well prepared and well manured, is one of the best means for obtaining a good crop of Peas. A dressing of coal ashes along the rows also favours growth. It is recommended that Peas should follow Cabbages or root-crops. All kinds of shelter for the beetles should be abolished. To free the plants when attacked, a dressing of lime, or of soot, sprinkled on the wet plants, has proved useful; and gas-lime, or sand mixed with paraffin, scattered on the soil along the rows, would probably help considerably. Harrowing, or hoeing the Peas when wet, is also said to be of marked benefit. Shaking the plants over tarred canvas, or over sheets, from which the beetles can be swept up

Pea *—continued.*

and destroyed, will materially help in reducing their numbers. For means of preventing ravages of root feeding larvæ, *see* **Noctua** and **Wireworms**.

The mining larvæ of the fly *Phytomyza* do so little harm, that, as a rule, it is unnecessary to take means against them; the only method of cure seems to be crushing the larvæ, while in the leaves, between the finger and thumb. For means to be employed against the larvæ of the larger moths, *see* **Mamestra** and **Potherb Moths**.

If Aphides appear on the young shoots, the best treatment is to nip these off at once and burn them, and thus prevent the Aphides from increasing and spreading to the remaining parts of the plants. To free a few plants from Green Fly, dressings of soot on the wet plants, or of soap-suds, would be advantageous.

Humble Bees are seldom so hurtful to Pea flowers as to counter their destruction needful, more especially since they do good by effecting, or, at least, aiding in securing the advantages of cross-fertilisation. If it should become desirable to reduce their numbers in any garden, this can only be done by catching the individual bees, and by seeking out and destroying their nests, bodkin in holes, moist mice, &c.

The Pea Midge (*Cecidomyia Pisi*) seldom does much evident harm; the only methods of limiting its ravages are: Picking the diseased, yellow-spotted pods, and digging down the surface soil to destroy the pupæ.

Against all the larvæ that feed in the seeds, the most useful remedy is to expose the latter for a time to a heat of about 110deg. Fahr. This heat will destroy the larvæ, but will not injure the seeds.

Pea-straw should be removed and burned as early in the autumn as possible. Since the beetles and moths also burrow into the ground to become pupæ, whatever may help to destroy the pupæ in the earth will be of service. Trenching the soil is of special value, since it leaves many of the pupæ too deep to allow the insects to reach the surface, and other pupæ are exposed to the eyes of birds. Applications to the plants of soot, or of any other disagreeable substances, might prevent the female insects from laying their eggs thereon.

PEA, SCURFY. *See* **Psoralea.**

PEACH (*Persica vulgaris*). The Peach has been cultivated in this country since the middle of the sixteenth century, about which time it is said to have been introduced. Although generally stated to be a native of Persia, De Candolle considers the Peach to be of Chinese origin, this question being very fully treated in that author's "Géographie Botanique" and "L'Origine des Plantes Cultivées." It was known to Theophrastus in 322 B.C. Its cultivation is now more or less extensively practised over a large portion of Europe and America. In this country, the trees require protection of some sort, particularly during the spring. This is provided by planting them under glass, or against walls outside, with a southern exposure, temporary coverings being used in the latter case, throughout the flowering period, and until the fruits are set. Trees planted in the open ground never become sufficiently ripened to bear fruit: consequently, their culture is seldom attempted, except in a young state, without proper protection being provided. Peaches are grown in abundance throughout the warmer parts of Asia, and also in many provinces of the United States. In France, their cultivation receives considerable attention, and the fruits obtained are of excellent quality. Peach culture in this country, particularly forcing under glass, forms one of the most important of gardening operations amongst fruit-trees; and the success or failure of one early and another depending very considerably on details of management, which require to be thoroughly understood. The fruit of the Peach is, more or less,

Peach—*continued.*

round, and is characterised by having a delicate, downy skin, with a furrow or suture on one side, proceeding from the stem to the apex, and varying in depth in different sorts. When properly ripened, it is highly valued, and deservedly accorded a prominent position, both amongst dessert and exhibition fruits. For propagation, general cultivation, forcing, and other remarks respecting Peach-trees and their management, *see* **Nectarine**.

Sorts. Subjoined is a selection of the best and most esteemed Peaches, all of which are worthy of cultivation, where there is sufficient accommodation, and a supply is required over a lengthened period each year. It will be observed that many of the varieties described were raised at, or have emanated from, the Sawbridgeworth Nursery. The new varieties raised at Sawbridgeworth are chiefly the result of Mr. Rivers' experiments in hybridising and raising such quantities of Peaches and Nectarines from seed. The pollen of the Stanwick Nectarine was used, and the stain of blood is very evident in the Nectarines, which are entirely changed in character. The experiments were commenced many years ago, and several most valuable acquisitions to varieties of hardy fruits have, as a consequence, been secured.

À Bec. Flowers large. Fruit large, of uneven outline, terminated with a prominent nipple at the apex; skin yellowish, dark crimson next the sun; flesh white, tender, and melting. End of August. Glands round. A fine variety.

Acton Scott. Flowers large. Fruit medium, nearly round; skin deep red next the sun; flesh pale yellow, melting, and rich. End of August. Leaves crenate; glands round. A rather small-fruited, but excellent, free-bearing sort.

Albatross. Flowers large. Fruit very large, round; skin pale yellow, mottled and streaked with dark crimson; flesh white, rich, and good. Middle of September. Leaves glandless. A fine late Peach, raised by Mr. Rivers.

Alexander. Flowers large. Fruit large, round, of a brilliant colour where exposed to the sun; flesh yellowish-white, juicy, and brisk in flavour. Early in July, in an orchard-house. Glands round. An excellent and very early Peach, of American origin, introduced by Mr. Rivers.

Alexandra Noblesse. Flowers large. Fruit very large, round; skin downy, very pale; flesh white, melting, richly flavoured. Middle of August. Leaves smooth, glands round. A very fine Peach, raised by Mr. Rivers from NOBLESSE; in consequence of its smooth leaves, it is considered less liable than its parent to be attacked by mildew.

Barrington. Flowers bright red, large. Fruit large, somewhat flattened, with a prominent nipple; skin downy, deep red next the sun; flesh whitish green, tinged with red near the stone, of excellent flavour. Middle and end of September, succeeding ROYAL GEORGE and NOBLESSE. Glands round. The tree is a vigorous grower, and, generally, a good bearer.

Belle Bauce. Flowers pink, large. Fruit large, somewhat depressed or flattened at the summit, skin downy, deep red next the sun, and mottled all over; flesh white, tinged red near the stone, juicy and rich. Middle of September, or ten days later than ROYAL GEORGE, of which it is considered but a variety. Leaves crenated; glands round. A handsome Peach.

Belle de Doué. Flowers small. Fruit large, deep red next the sun and mottled all over; flesh melting, very richly flavoured. End of August and beginning of September. Glands round.

Bellegarde. Flowers deep rose, small. Fruit large, somewhat globular, or nearly spherical, with very small nipple and distinct suture; skin excessively downy, violet-red on the shady side, blackish-purple where exposed; flesh yellowish-white, full near the stone, melting and juicy. Ripens with the Belle of August and beginning of September. Leaves large, serrated with round glands. This variety will be considered by many English pomologists as identical with the GALANDE of the French. The BELLEGARDE of the French pomologists is a different sort with large flowers, and of no special merit in this country. Syns. English Galande, French Galande, Galande, Noir de Montreuil.

Chancellor. Flowers small. Fruit large, roundish and flattened, dark crimson, pale greenish-yellow on the shaded side, rich pale yellow, deeply rayed with red at the stone, juicy and rich. Middle of September. Glands reniform or kidney-shaped.

Condor. Flowers large. Glands reniform. A comparatively new but very fine sort, raised by Mr. Rivers, and described as follows: "A large Peach from EARLY SILVER; colour bright crimson, fine pigment and rich. August."

Crimson Galande. Flowers small. Fruit medium or large, roundish, very deep crimson, almost black, flesh deeply stained with

Peach—*continued.*

red near the stone, tender, melting, and richly flavoured. Middle and end of August. Glands round. A hardy and prolific variety, raised by Mr. Rivers.

Desse Tardive. Flowers small. Fruit large, round, of a pale colour, slight red next the sun; flesh greenish-white, sweet and rich. End of September and beginning of October. Glands round. One of the best late Peaches.

Dr. Hogg. Flowers large. Fruit very large, round, pale yellow, tinged with crimson next the sun, and similarly dotted on the shaded side; flesh firm, yellowish-white, red at the stone, rich and sugary. Middle of August. Glands kidney-shaped. A remarkably vigorous-growing variety, which bears freely, but is not adapted for forcing; raised by Mr. Rivers.

Dymond. Flowers large. Fruit very large, flattened at the summit, mottled red on the exposed side; flesh white, stained red near the stone, highly flavoured. Middle of September. Leaves glandless.

Early Beatrice. Flowers large. Fruit medium, round; skin marbled, very highly-coloured where exposed; flesh nearly white, melting, juicy, and richly flavoured. Early in July, in an orchard-house, and outside at the end of that month. Glands small, kidney-shaped. One of the earliest sorts known; raised by Mr. Rivers.

Early Rivers. Flowers large. Fruit large, pale yellow, with delicate, flesh-coloured dots on the exposed side; flesh pale, melting, remarkably rich and juicy. Middle of July, in an orchard-house. Glands kidney-shaped. A valuable, very early Peach; it was raised by Mr. Rivers, who states that it is apt to crack at the stone, when the fruit ceases to swell, and has no flavour. To obviate this cracking, he recommends that it should be fertilised with pollen from other flowers, as it is possible the immaturity arises from insufficient impregnation.

Early Silver. Flowers large. Fruit very large and pale, with blush cheek next the sun; flesh white, melting, and rich. Middle of August. Glands kidney-shaped. Requires a warm position and favoured situation. Raised by Mr. Rivers from seed of the WHITE Nectarine, the flavour of which it partially retains.

Exquisite. Flowers small. Fruit very large, deep yellow, with dark crimson cheek; flesh yellow, stained with deep red at the stone, rich, and melting. Middle of September. Glands round. A fine-flavoured American sort, of immense size.

Golden Eagle. Flowers small. Fruit very large, round, depressed, orange-colour, with some red on the exposed side; flesh stained red near the stone, tender, rich, and melting. End of September or early in October. Glands kidney-shaped. One of the best yellow Peaches; raised by Mr. Rivers.

Goshawk. Flowers large. Beginning of September. Leaves serrate, glandless. A very large, pale-coloured, mid-season Peach, raised from an American sort, named COOLEDGE'S FAVOURITE; it is of excellent quality.

Grosse Mignonne. Flowers deep red, large. Fruit large, somewhat hollowed at the summit, and furnished with a deep suture, which appears to divide it into two parts; skin downy, pale yellow, mottled with red, dark red next the sun; flesh pale yellow, red near the stone, juicy, rich, and highly flavoured; stone small, rough. End of August and beginning of September. Glands round. This splendid mid-season Peach is one of the best in cultivation, either for forcing or for any purpose, if only one sort were required. It has been grown for a very long period, and twenty or more varieties, sent out at various times as being new, have eventually been found to be identical with it. This may be accounted for to a great extent from its being one of the most highly-esteemed sorts, and from the fact that it reproduces itself from seed.

Hale's Early. Flowers large. Fruit medium, round, depressed at the summit; skin dark crimson, particularly next the sun; flesh yellow, melting, and very good. End of July or beginning of August. Glands round. A first-rate, very early Peach, of American origin; well adapted for forcing.

Late Admirable. Flowers pale red, small. Fruit very large, somewhat oblong, with swollen nipple at the apex; skin downy, dull crimson, striped, deeper crimson next the sun; flesh yellowish-green, red near the stone, very juicy, of delicate flavour. Middle or end of September. Glands round. One of the best late Peaches, particularly under glass.

Noblesse. Flowers large. Fruit large, sometimes rather pointed, sometimes depressed, yellowish-green on the shaded side, delicately marbled, and streaked with red on the side next the sun; flesh white almost throughout, melting, exceedingly juicy and rich. End of August and beginning of September. Leaves glandless. A most valuable variety, which may be successfully forced, but the tree is sometimes subject to mildew.

Princess of Wales. Flowers very large. Fruit very large, rounded, terminated by a prominent nipple; skin cream-coloured when ripe, with rosy cheek; flesh yellowish, red at the stone, of excellent quality. End of September and beginning of October. Glands round. A very valuable late Peach, raised by Mr. Rivers from a Clingstone variety, named PAVIE DE POMPONE, worthless in this country.

Peach—*continued.*

Rivers' Early York. Flowers large. Fruit medium, marbled with red on the shady side, deep red where exposed; flesh greenish-white, melting, and richly flavoured. Beginning and middle of August. Leaves smooth; glands round. A variety raised by Mr. Rivers from the old EARLY YORK, on which it is an improvement, inasmuch as the tree escapes mildew much better, and generally produces a good crop. It is well adapted for forcing.

Royal George. Flowers dull red, small. Fruit large, globular; skin downy, deep red next the sun, dotted on the shaded part; flesh yellowish-white, red near the stone, juicy, rich, and excellent. End of August and beginning of September. Leaves glandless. One of the best-known and most highly-esteemed sorts. It forces well, but the tree is subject to mildew.

Sea Eagle. Flowers large. Fruit very large, round, lemon-yellow, deep red on the exposed side; flesh white, stained red near the stone, highly flavoured. End of September. Glands round. One of the best late Peaches; raised by Mr. Rivers from the variety named EARLY SILVER.

Stirling Castle. Flowers small. Fruit medium, roundish, pale-coloured, marbled red where exposed; flesh white, melting, and rich. Beginning of September. Leaves glandless. A hardy sort.

The Nectarine Peach. Flowers large. Fruit very large, pointed; skin nearly smooth, like a Nectarine, yellow, mottled red on the exposed side; flesh brisk and richly flavoured. Middle and end of September. Glands small, kidney-shaped. A first-rate late variety, raised by Mr. Rivers from a seed of a Dutch Nectarine, called LE GRAND NOIR.

Walburton Admirable. Flowers small. Fruit large, round, yellowish-green where shaded, crimson-mottled, with a darker colour where exposed; flesh yellowish-white, juicy, and rich. End of September and beginning of October. Glands round A very valuable late Peach.

FUNGI. The most noteworthy Fungus parasitic on the Peach is *Exoascus deformans*. This causes one form of Peach Curl, or Peach Blister, so called from the appearance it gives rise to in the leaves. The other form of Peach Blister is caused by Aphides, and may be recognised by the presence of those insects, and by the red colour of the diseased leaves. *E. deformans* makes its presence manifest by the appearance of the leaves, and by a pale bloom, visible chiefly on the lower surface. The microscope shows that this bloom is due to the presence, all over the leaf, of innumerable erect, slender cells, containing spores, and each supported on a shorter cell. The Cherry, the Gean, and the Plum, are also liable to suffer through attacks of this Fungus; but in these trees it gives rise to the so-called "witch-knots," or short branches arising in a crowded mass, the leaves and twigs of which show the bloom of the Fungus at certain times of the year. The leaves covered with *E. deformans* wither and fall off prematurely; and even while on the tree, they cease to be of use to the host-plant. Besides this, the tissues of the host are diseased by the Fungus, and it reappears year after year on the same branch system. The only remedy is to cut off and destroy the diseased branches and leaves.

Sphærotheca pannosa, a mildew, is of frequent occurrence on the Peach. It forms a dense, greenish coat over the parts affected, living on the outer surface of the cells of the host-plant. Flowers of sulphur, or the solution of potassium sulphide, is the most effectual cure for this disease. *See* **Mildew**.

Certain small pale spots may, at times, be observed on Peach leaves, the work of small species of Fungi, named *Cercospora Persicæ* and *C. circumscissa*. The injury done by them is too slight to call for a longer notice here.

INSECT PESTS. The Peach-tree is liable to injury from insect operations in several ways, but only those of more frequent occurrence need be specified. A small moth (*Anarsia lineatella*) destroys from two to several inches at the tips of the branches, by its larvæ boring into them, and eating the pith from them in spring and early summer; while the larvæ of an autumn brood eat into the fruits while on the trees. This insect belongs to the *Tineina* (*see* **Moths**), but is larger than the average of that group, reaching a span of nearly 1in. across the front wings, which are grey, with darker grey markings,

Peach—*continued.*

especially a dark lozenge-shaped mark on the front margin. All the wings are narrow, and long-fringed. This insect is found both in Europe and in North America.

A Weevil, *Otiorhynchus ligustici* (*see* **Otiorhyncus**), gnaws the leaves of the Peach, as well as of many other trees. The larvæ of several of the larger moths and butterflies also eat the leaves; but the harm done by them is seldom serious. A Sawfly (*Lyda nemoralis*), in the larval state, lives on several trees of the group of stone-fruits, and among these is the Peach; the larvæ live in colonies, but each in a separate tube, protected in the common web (*see* **Lyda**). The webs, with the inclosed larvæ, are easily removed and destroyed.

The worst insect enemies of the Peach-tree are Aphides, of which several species are found on it in Britain. The most hurtful is *Aphis Persicæ*, B. de Fonsc. (*A. Amygdali*, Buckton), since it causes the young leaves near the tips of the branches to assume a blistered appearance, to become thickened and red, and to curl up, so as to form retreats below them, in which the insects live protected. The leaves become useless to the tree, and drop off prematurely. The insects are of an ochreous or rusty-yellow colour, with dark brown or black markings covering a great part of the upper surface. *Myzus Persicæ* and *Hyalopterus Pruni* are both common on Peach-trees; but they do not give rise to the distortion of the leaves, though hurtful by covering the leaves with their skins and excretions, and weakening the trees by the food they draw from the tissues. The former species has the wingless female rosy or rusty-red, the winged female brown or almost black, and the male citron-yellow. The latter has the wingless female pale green, and the winged female yellowish-green. When *Aphis Persicæ* appears, the twigs most affected should be cut off and destroyed, with their inhabitants. For all the species, washes may be used, such as soapsuds, or a solution of 1lb. of soft soap in five gallons of water, or a solution of soft soap with tobacco. These liquids may be pumped on from a garden engine, or the infested twigs may be dipped into them; but special care must be taken to reach the insects on the under surface of the leaves.

The Peach Scale insect (*Lecanium Persicæ*) lives on the buds and branches of Peach, Plum, and various other trees. As in the allied species (*see* **Scale Insects**), the female is covered with a slightly convex, oval shield. This is brown, with a yellowish dorsal line, and two darker spots at the sides. As the eggs become matured, the shield becomes nearly hemispherical, and the legs

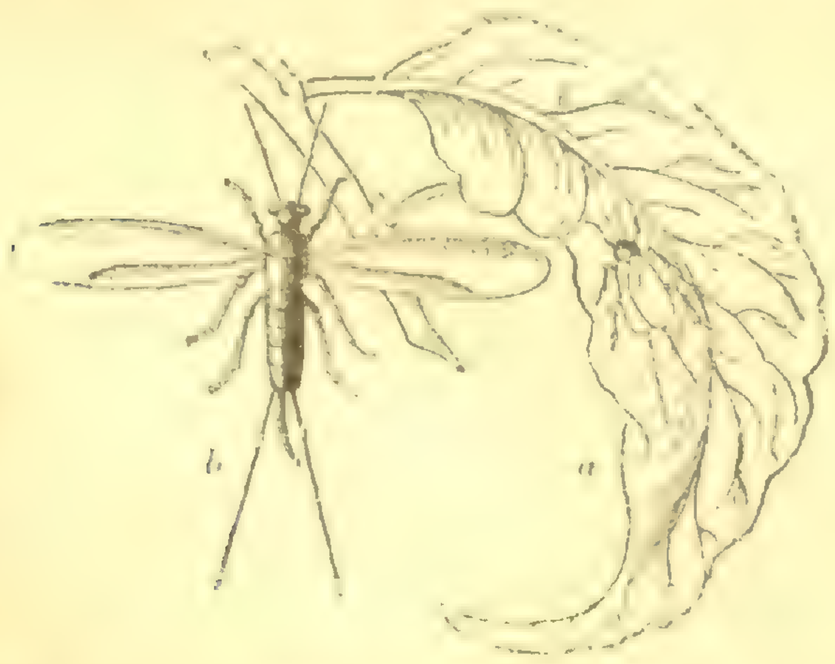


FIG. 43. LECANIUM PERSICÆ, showing (*a*) Leaf, with Male on it, slightly enlarged; (*b*) Male flying, much enlarged.

disappear from the lower surface. The males (see Fig. 43) are smaller than the females, have two wings, and bear two slender filaments, like tails; they are dark red-brown, with black head, and yellowish antennæ and legs.

Peach—*continued.*

For this, as for the other Scale insects, the best treatment is the use of a stiff brush, with similar solutions to those employed against **Aphides** (which *see*), or with paraffin, to remove them from the branches.

Lastly, the fruit of the Peach is, in common with the other stone-fruits, inhabited occasionally by the larva of a beetle (*Anthonomus druparum*), which feeds in the seed, but usually does not greatly check the growth of the edible part of the fruit. This beetle is nearly related to the **Apple Blossom Weevil** (which *see* for methods of prevention and remedies).

PEACH BLISTER. A blistered and curled state of the leaves, which become somewhat fleshy, and fall prematurely. It may be caused by a Fungus, *Exoascus deformans* (*see* **Peach Fungi**), or by Green Fly, of which the worst species is *Aphis Persicæ* (*see* **Peach Insects**).

PEACH MYRTLE. A common name for *Hypocalymma robustum.*

PEACOCK FLOWER. A common name of *Poinciana regia.*

PEACOCK FLOWER FENCE. A common name for *Adenanthera pavonina.*

PEA, EARTH. *See* **Lathyrus amphicarpus.**

PEA, EVERLASTING. *See* **Lathyrus sylvestris platyphyllus.**

PEA, FLAT. *See* **Platylobium.**

PEAGLE. An old name for *Primula veris.*

PEA, GLORY. *See* **Clianthus Dampieri.**

PEA MOTH (*Grapholitha pisana*). In the larval state, the Pea Moth is one of the most hurtful insects to the vegetable which it infests, and is, at the same time, very common. It is also known as *Endopisa proximana.* For a full description of this Moth, methods of extermination, &c., *see* the remarks on INSECTS under **Pea.**

PEA NUT. *See* **Arachis hypogæa.**

PEA, PARTRIDGE. *See* **Heisteria.**

PEA, PIGEON. *See* **Cajanus indicus.**

PEAR (*Pyrus communis*). The Pear-tree has been known, and has been under cultivation, from a period of remote antiquity. It is found wild in some parts of England, is a native of most temperate parts of Europe and Western Asia, and is also found in the Himalayan region; other wild types, besides *P. communis*, have had more or less to do with the origin of many cultivated Pears. In a wild state, its branches are thorny; but, under cultivation, the thorns disappear, and are replaced by fruit-buds, which are formed on shoots of about the same length, technically termed spurs. The tree is naturally more inclined to grow in a pyramidal form than the Apple-tree (*Pyrus Malus*). It differs also from the Apple in being longer as a seedling plant in coming into bearing; while, on the other hand, under favourable conditions, it is very much longer-lived. The Pear can, however, scarcely be considered so hardy as the Apple, as it is not found so far north, in either a wild or cultivated state. In old orchards, where Pear and Apple-trees have been growing under similar conditions, it has been noted that the former were in full vigour, and bearing abundantly, long after the latter had disappeared, or had been removed in consequence of natural decay. The Pear does not produce fruit on the former year's wood, but on spurs which grow out of wood not less than a year old. On the points of these, buds are formed, and the flowers are produced from each, in corymbs of from five to nine (see Fig. 44, which shows two corymbs of flowers). A large proportion of these

Pear—*continued.*

flowers will usually fall off at an early stage of growth, because of their being unable to compete with stronger ones, which take a lead, if weather and other conditions allow them to set properly. Were all the flowers to set and be allowed to come to maturity, the size and quality of fruit throughout would be materially affected. This is not of very frequent occurrence generally; but, should it take place, thinning is an obvious remedy. The uses of Pears are pretty well known. First, and most important, as dessert fruits, nearly all the best varieties are highly esteemed. For kitchen use, some few sorts are specially adapted, because of their fruits being large, and the flesh firm and somewhat austere rather than sweet; this renders them more suitable for stewing, baking, &c. Another use for Pears is that of producing perry. Fruits for this purpose may be either large or small; the more austere or rough their taste, the better is the liquor product considered.

FIG. 44. FLOWERING BRANCHLET OF PEAR.

PROPAGATION. This may be accomplished by seeds, by cuttings, by layers, and also by budding and grafting. Seeds are sown with a view to raising new varieties, and more largely for the purpose of procuring stocks, whereon to graft sorts already approved.

Seeds. Seedlings might be raised in rather large pots (about 9in.) of loamy soil, which should be covered with pieces of slate or board at the time of sowing, to prevent any depredations of mice, and placed on bricks or tiles, to stop worms from entering. If sown in autumn, and the pots are placed in a sheltered position outside, the young seedlings may be expected about March, when the coverings must be removed. Seeds sown later on will require about three months to germinate, while some may keep dormant for nearly a year. The young plants may remain in their pots one summer, and be transferred to the open ground the following autumn. Only the seeds of first-class sorts should be reserved for raising others, and they should be saved from fine fruits which have been gathered from healthy, vigorous trees. Seedling Pears seldom bear fruit before the sixth or seventh year. Seeds intended only for the purpose of raising stocks may be collected, cleaned from the pulp by washing, and afterwards sown in the open ground. Drills about 9in. apart, and 2in. deep, are suitable; the soil should be previously well pulverised and prepared. The seedlings may be transplanted when a year old, and grown on until they are large enough for grafting.

Cuttings and Layers. Propagation by cuttings is a slow process, only to be recommended for preserving a variety (that might otherwise become lost) until some

Pear—*continued.*

grafts are procurable. It is not, at all times, an easy or a certain method. Layering is practicable, if it is desired to have trees on their own roots; but there are few, if any, advantages to be derived, and, consequently, this system is not much practised.

Budding and Grafting. These are the principal methods adopted for propagating Pears; the former is practised in the months of July and August, the latter chiefly in March and April, or so soon as the sap begins to flow. Whip or tongue-grafting is the plan best suited; but, according to Baltet, side-grafting under the bark in July and August, cleft-grafting, inlaying in March and April, and crown-grafting in April and May, are also applicable. The trees may be worked as standards, or close to the ground, according to the sort of stock and the form in which it is eventually intended to train them.

Stocks. The principal stocks used for Pears are the Pear itself, either common or wildings, the Quince, and sometimes the Whitethorn. On the common Hawthorn, the Mountain Ash (*Pyrus Aucuparia*), and the Medlar (*Mespilus germanica*), the Pear may also be grafted with more or less success; but the Pear stock and Quince are the best, and are most extensively used. Pear stocks, as already indicated, are raised from seeds; those obtained from the wild or from common sorts are well adapted. Stocks from Quince are readily propagated from cuttings, taken with a heel, or, better, by means of layering. Old stools that are strong enough to produce vigorous shoots, may be covered with soil; and, during autumn, after a sufficient time has elapsed for the shoots to root, they may be detached and transplanted in the different sizes that are calculated to be ready for grafting about the same time. Layering of short Quince shoots for stocks should be practised some time during winter, and the rooted plants will be ready for removal so soon as the leaves drop in the following autumn. Whitethorn stocks are raised from seeds.

In the cultivation of Pears, the sort of stock on which the trees are worked has always a very important bearing, particularly in certain soils, on the general health, vigour, and fruitfulness of the trees after they become established. The Pear stock is, of course, the most natural, and trees grafted on it possess more vigour, and attain a greater age, than do those on any other. The roots, however, have a tendency to penetrate deeply into the subsoil, which is, in many localities, cold and unsuitable to their requirements; they are also long, and have but few small fibres: consequently, the trees do not transplant readily, unless the work is rather frequently undertaken, and the roots are kept pruned. In deep and rich land, the Pear stock is apt to induce a too luxuriant growth, which is attended with comparative unfruitfulness; but, in hot districts, and in chalky soils, this stock may be found to possess considerable advantages over any other. Grafting of seedling Pear stocks may be practised, either close to the ground, or at any desired height, as stock and scion are inclined to enlarge at about an equal rate. For standards, only stout, vigorous stocks are suitable for grafting at some height up; weak ones are, for this purpose, of little use, unless worked near the ground with a variety likely to be of sufficiently upright growth to form the requisite stem itself. Preparations for grafting should commence by cutting off scions before any signs of vegetation appear, and laying them in deeply under a north wall. The stocks should also be cut back near to where the union is intended, before the sap commences to rise.

In contrast to the Pear stock, and its method of rooting, as already referred to, stands the Quince, which offers many advantages in comparison. It encourages a dwarfer growth, and an earlier bearing habit, and the fruit is often more highly coloured and better ripened. The Quince forms numerous fibry roots within a short distance from

Pear—*continued.*

the surface, none of which are inclined to go deep; consequently, the trees may be readily and safely transplanted, even when they are several years old. This stock is specially adapted for shallow soils, for damp situations, and for planting where the subsoil is of an unfavourable description. Ripening of the wood goes on concurrently with that of the fruit, and the less vigorous growth which is encouraged has, therefore, a much better chance of becoming matured in autumn. As Quince wood does not usually enlarge so rapidly as that of the Pear, grafting should be performed as close as possible to the ground, and, after the clay is added, some soil should be brought and heaped over it. If a Quince stock were grafted with a Pear at any distance above ground, in all probability, the scion above would eventually enlarge faster, and the tree stem would be of less diameter near the ground than higher up. By working low, and keeping the Quince portion from being exposed, this may be avoided. For procuring standard trees on Quince roots, it is, therefore, best to adopt a system of double-grafting—that is, work a vigorous variety of Pear at the base, to grow and form a stem, on which any desired sort may be grafted higher up. Double-grafting proves very advantageous with many varieties of Pears, but it does not answer on all alike. On this point, Mr. Rivers, who makes the system a speciality, states: "Double-grafted Pears seem always to make healthy and prolific trees; it must not, however, be concluded that to graft a free-growing sort of Pear on the Quince and then to regraft it with the desired sort, will always answer. Some kinds require the stock belonging to their race; this can only be found out by the clever cultivator—as, for instance, the Jargonelle on the Beurré d'Amanlis, the union of which is perfect, and the trees healthy. Gansel's Bergamot, double grafted, becomes a marvel of fertility." It is especially important that Quince stocks intended for grafting should be cut back, for the purpose, very early in the year: active growth begins, in favourable weather, by February, or, at least, the sap commences to flow; and if heading back is deferred until this takes place, the upper part of the stock left will often die, and the grafts in consequence fail to unite.

CULTIVATION. *Soil and Situation.* Any fairly rich, loamy soil, of good depth, with a subsoil sufficiently well drained to prevent the possibility of stagnant water accumulating, will usually be found to suit Pear-trees. When planting, the size of garden, and the amount of wall space available for the tree in question, should be taken into consideration, as well as the character of the soil. The last-named item must, to a considerable extent, determine the sort of stock best suited—namely, whether it shall be the Pear or the Quince. On the first-named stock, the trees will prove more vigorous, and will require a greater depth of soil; the result frequently being that a much longer period must elapse before they arrive at a bearing state. Where space is limited, and the soil shallow, trees on the Quince stock should have preference over others. It is important to remember that the roots of a tree worked on Quince are concentrated very close to the base, and are situated very near the surface. They require, because of this, more frequent attention by way of replenishing part of the soil around them, and by the application, at least annually, of a thick mulching of good manure, which tends to preserve moisture as well as to afford nutriment. Some sorts of Pears, worked on Quince, have a tendency, in a favourable season, to bear an unduly heavy crop, which, if allowed, would be likely to check the new growth and bring the tree to a stunted and unfruitful state. This must be avoided, by thinning the fruit under such circumstances, when in a young state, or by giving special attention to supplying sufficient nourishment throughout the bearing season, for perfecting the crop, without risking the proper maturation of wood for the following year. Although the Pear will often succeed in a rather strong, loamy soil, it will not do so on heavy clay, unless previously well drained, trenched, and allowed to become pulverised. To encourage a start in young trees, where the soil is somewhat unfavourable or poor, a compost of turfy loam, decayed manure, and old potting soil, if procurable, should be mixed and applied above the roots, after they are merely covered with soil from which manure is excluded. It is of importance that the roots be carefully and evenly spread out in planting. Regarding the various situations in which Pears succeed, much depends on the different localities and the sorts grown. Even where good sorts are found to succeed fairly well in the open garden, their fruits are invariably much improved in quality if some trees are favoured with a position against a wall. Wall space is usually limited, yet it is questionable if it could be more profitably occupied than by good sorts of Pears—at least, in gardens where the fruit is much valued, and where samples from the open rarely attain a state approaching perfection. A south aspect is that recommended for really good dessert sorts; many will also do well on walls, with either an eastern or a western exposure. The frequent failure of the Pear crop may principally be attributed to the extremely precarious weather so generally experienced in spring, when the trees are in blossom, and also for a time afterwards, when young fruits should be continuing to make progress in swelling off. Trees against walls may then be more readily protected with temporary coverings of some sort than others fully exposed; the wall, moreover, is of material help in itself, affording shelter particularly if some coping boards are fixed near the top, somewhat like those in frequent use over Peach-trees.

Systems of Training. There are numerous systems of training Pear-trees, according to the purpose for which the trees are required, and the position they are intended to occupy. For the open garden, standard and bush trees, pyramids, espaliers, and cordons are each and all available; for walls, the modes of training usually adopted are the horizontal, the fan, and double or triple cordons, trained in either an upright or an oblique direction. Dwarf lateral cordons, with stems about 1ft. high, and two branches trained in opposite directions, are suitable for planting in sunny positions alongside walks, where they occupy but little space, and usually succeed on warm, rather light soils. Espalier training has long been popular for the open ground. It admits of trees being planted within about 2ft. of the edge of a walk, and the ground may be cropped to within a short distance of their base. An espalier fence on which to train Pear-trees may be formed by straining horizontal wires 1ft. apart, on a framework about 6ft. high. This would admit of a tree being trained with an upright stem and six horizontal branches on either side. If several espalier trees were permanently planted in a continous line, a space of from 16ft. to 20ft. should be allowed between each two; cordon or other trees might be grown in this space, with a view to their being removed before the other branches meet. Espalier fences are more frequently formed of wooden rails, or stout upright stakes, than of wires, on account of the expense incurred in erecting the latter, and the objection usually taken to their appearance when fixed. This arrangement is also preferable where only a few espaliers are grown and where the trees are widely disposed. The pointed ends of stakes so used should first be charred or dipped in hot creosote. Espalier training has many advantages over other systems. It admits of all the branches being well exposed to light on both sides, and easy facilities are also afforded for regulating them, so as to equalise the flow of sap. The fruits on such trees are usually not much injured by rough winds, and it is a comparatively easy matter to protect the blossoms in spring. Besides

Pear—*continued.*

horizontally-trained trees, the five-branched vertical, and single cordons, may be grown on strained wire fences, in which position, if some slight protection is afforded the trees when in flower, good results may be obtained.

Standard Pears are mostly worked on the Pear stock. This form of tree is not much planted in kitchen gardens, but is most frequently seen in paddocks, orchards, &c., and is still more extensively adopted for market gardens, where the ground beneath is cropped with bush fruits, &c. When once properly started, standard trees grow rapidly, and soon arrive at a bearing state. They may be planted in rows at about 30ft. apart, and 25ft. distant in the rows; or more space may be allowed according to circumstances.

Bush Pear-trees on the Quince stock are usually very productive, and, when laden with fruit, are exceedingly ornamental. They are specially adapted for small gardens, and may be planted as close as 4ft. or 6ft. Bush trees may readily be kept at a height not exceeding the latter figure, and eventually induced to grow nearly as much in diameter. When they are in full bearing, it is necessary to apply a good top-dressing of manure.

Pyramid training is largely practised with Pear-trees, and handsome specimens, some 15ft. high, are sometimes to be seen. Such trees, when once formed, invariably flower profusely, and, if the weather and season prove favourable, are very productive. Pyramids may be procured worked either on the Pear stock or on the Quince. On the Pear stock, and in good deep soil, 8ft. to 10ft. apart may be allowed in large gardens; for the Quince, 6ft. between will generally prove sufficient, particularly if space is limited.

Single, double, or triple cordons soon effectively furnish walls and afford opportunities for growing those varieties that are known to succeed, and for trying any reputed good sorts from other localities. The trees may be trained vertically or obliquely; for high walls, the first-named plan may be adopted, while an oblique angle would allow a further extension on a low wall. They may have been worked on either Pear or Quince stocks, according to which succeeds best; and, in planting, provision should be made for allowing a space of from 1ft. to 1½ft. between each two of the cordon branches. The different sorts of cordon will, therefore, cause a variation in the distances apart to be allowed when planting.

Pear—*continued.*

Horizontal training is the system perhaps most generally adopted for Pear-trees on walls; that is, an upright stem is secured, with branches proceeding horizontally in either direction. If grafted on the Quince, these trees should not be situated much wider apart than 12ft.; otherwise, the branches from each will not extend sufficiently far to properly occupy the intervening space. On the Pear stock, they may be planted about 20ft. apart. Walls being so expensive to build, and so valuable for the cultivation of fruit-trees, it is most important that their surfaces should be covered with branches as quickly as possible. The branches on trees horizontally trained require to be about 1ft. apart, and, as generally only one pair can be obtained each year, the system for wall-covering is rather a slow one. To utilise the intervening space between permanent trees, riders may be planted midway, and trained as well as circumstances admit, something in the way suggested at B, Fig. 45, where A, A represent the permanent trees. Such temporary trees for fruit-production are not much to be depended upon, as they have to be cut away when the others require space, and this is, perhaps, just at the time they arrive at a bearing state. One of the chief essentials with horizontal trees is to keep their lower branches equally vigorous with the more favourably-placed upper ones. To effect this, it is frequently necessary to raise the former in an oblique direction, while the latter are kept horizontal, until of about an equal strength, when they may all be trained horizontally. In order to furnish

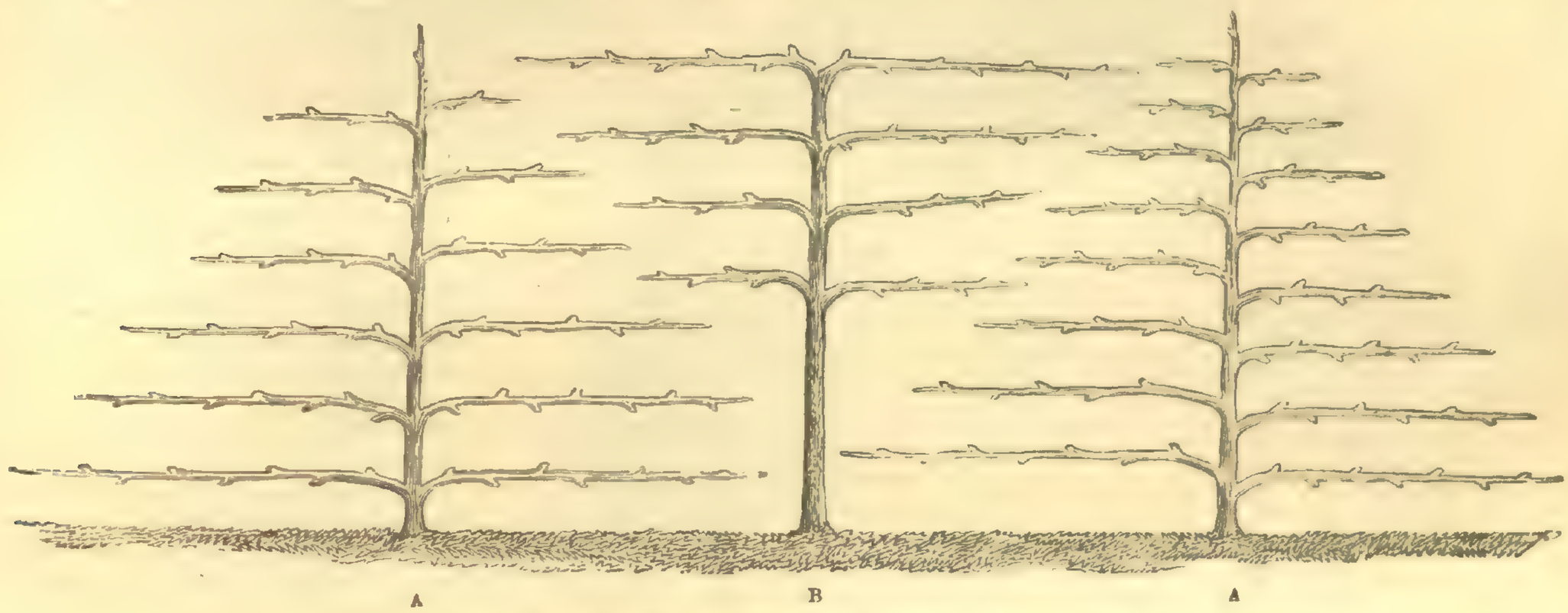


FIG. 45. HORIZONTAL SYSTEM OF TRAINING PEAR-TREES.

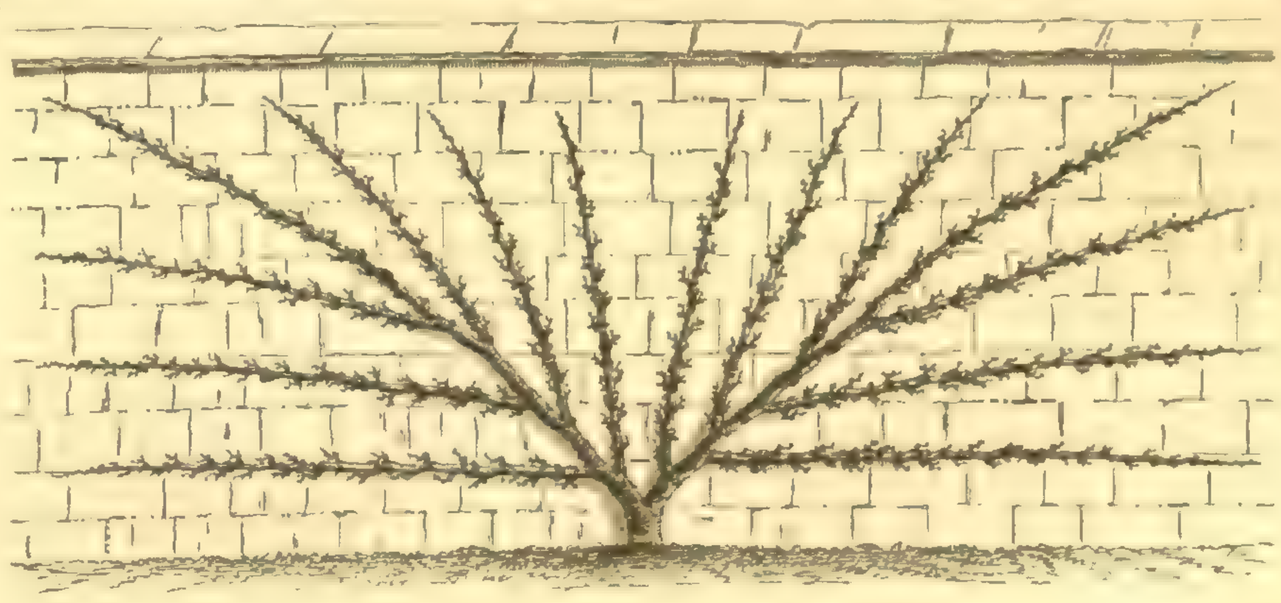


FIG. 46. FAN-TRAINING OF PEAR-TREES.

the angle between two permanent trees trained under this system, the upper pair of branches of a rider would of necessity have an undue advantage over the others below, as shown in the illustration to which reference

Pear—*continued.*

has been made. This would be unavoidable, and a mere furnishing of the wall would be the chief result, with what fruit the untoward circumstances allowed.

Fan-training of Pears (represented in Fig. 46) is better adapted for walls that are much higher than those usually surrounding gardens, as, by it, the upper portions may be far more quickly reached and covered, than by the horizontal system. Fan-trained trees are not so easily managed in a young state as those grown on either of the other methods for furnishing walls to which reference has been made. When once established, they frequently, though not always, bear fruit of good quality, particularly near the tops of the branches. Since cordons have become more extensively cultivated, fan-trained trees have, to a great extent, been displaced.

Pear-tree Arbours. For covering a portion, or the whole, of a main, central, or other walk in a garden with Pear-

FIG. 47. PEAR-TREE ARBOUR.

trees, a plan such as that represented in Fig. 47 might be adopted. For training such trees, a curved iron bar would be best for forming the span, and affording the necessary support; trees on rider stocks, either on the Pear or double-grafted, being planted opposite each other, and trained in the way shown by the engraving. The centre of the span should be from 7ft. to 10ft. above the walk, according to the proportionate width of the latter. By summer pinching, such trees might be kept restricted without much pruning in winter, and only sufficient space for insuring the full admission of light and sunshine need be allowed between them when planting.

Pruning. Standard Pear-trees require but little attention in pruning, except in thinning out when it becomes necessary, and in shortening or removing irregular or weak growths. If allowed to grow naturally and somewhat erect, they soon form good heads, and commence bearing. Young standards may be cut back, after being

Pear—*continued.*

planted, to within about 6in. of where the grafts were inserted; and, if six main branches can be formed, they will be found sufficient, and should be allowed to extend. If bush trees are not allowed to form a central shoot, material assistance will be given in strengthening all the branches; these should not be shortened until the desired size of tree is obtained, and their limit is reached. Bush-shaped trees, grafted on Quince stocks, are never inclined to produce strong wood, especially when in full bearing, and are very easily managed. In form, established pyramids require to have an upright stem, and each main branch, from the top downward, should be shorter, horizontally, than the one immediately below it. To establish and train large pyramids with an even outline, requires considerable experience in pruning, and a great deal of attention to keep the main side branches regulated and the flow of sap evenly distributed. All the laterals formed in and about the centre must be pinched or otherwise removed in summer, in order that the branches and their foliage may receive the amount of sun and air which they require. Pyramids are specially inclined to form a mass of shoots if this is not attended to, and success with trees thus trained depends greatly on the proper and timely execution of summer pruning. Most sorts of Pears are naturally inclined to form a semi-pyramidal habit of themselves; and where the necessity of preserving an even outline is unimportant, the trees may be allowed to grow almost naturally, after being started as pyramids at a nursery. Horizontal and espalier-trained trees require pruning somewhat similar to each other. Young trees should be encouraged to grow strongly, by allowing their shoots to proceed without being shortened. During the latter part of summer, all lateral growths should be pinched or cut back to about five joints, beginning with the upper branches, and, after a few days' interval, doing those lower down. This will allow of the free admission of light and air, to assist in the formation of fruit spurs, and additional sap will also be diverted to the whole of the branches left.

Cordons of any shape should also be allowed to grow without any shortening whatever being practised on the leading growths when once they are fairly well started, and are of about equal strength. Mr. Rivers' system of pruning cordons, which he has frequently proved, and justly considers very simple, is as follows: "In June, stop the more robust shoots to four or five buds, leaving the well-balanced shoots untouched; in September, when the fruit has attained its proper size and colour, prune all the shoots down to three eyes. Under this system, the cordons look rather straggling and untidy during the summer, but neat enough in the autumn and winter. I believe that, by the exercise of moderation in pinching, the growth is more equally distributed; at all events, my cordons, whether single, double, upright, five-branched, or lateral, have produced an abundant crop of fine fruit, and I can recommend the system as perfectly sound."

Spur-pruning consists in shortening back and reducing

Pear—*continued.*

the number of spurs, when they are too numerous, or project too far from the branch. A spur is a short side branch, which either has proper blossom-buds at its apex, or only imperfectly-formed buds that elongate but slowly, compared with ordinary wood-producing shoots. It has already been stated that the fruit of the Pear is borne on spurs. The system or mode of bearing is

FIG. 48. FRUITING BRANCHLET OF PEAR.

shown in Fig. 48. It frequently happens that a tree has very numerous spurs, but only a few that are set with blossom-buds. The other slender ones produce leaves only, and, when they become numerous, it is more likely that they will, if allowed, still further increase, rather than diminish, as time goes on. To prevent this, and encourage the formation of more blossom-buds, such spurs should be thinned in winter, and cut back nearly close on the upper branches, at the same time thinning and shortening somewhat less severely those on the middle and lower branches respectively. This tends to cause the sap to be more evenly distributed over all parts of the tree, which further conduces to change numerous barren spurs into fruitful ones.

Root-pruning has a wonderful influence on Pear-trees worked on the Pear stock, when they become unfruitful from over-luxuriance, or because of their roots having entered a cold and unfavourable sub-soil. The Quince, being of weaker growth, curtails the supply of sap, which thus restricts the undue vigour of shoots, and causes a more generally fruitful habit. Hence, trees worked on it do not require root-pruning so frequently to insure fertility, as do those on the Pear. If trees requiring root-pruning are not too old, they should be lifted early in autumn, and their large roots cut back, while all others must be carefully preserved. All cuts should be finally sloped on the upper part of roots, leaving that beneath intact; this tends to keep the small new ones, when formed, near the surface, instead of encouraging them to proceed downwards. Root-pruning of large trees may be effectually performed by digging a trench round them, and shortening back the mains, to within, say, 3ft. or 4ft. of the base. The first year after this has been practised, the trees will not be likely to bear much fruit—indeed, the necessity of such an operation suggests that the wood is not in a proper fruitful condition—

Pear—*continued.*

but, in the following winter, the results will invariably be apparent by the presence of numerous spurs, furnished with properly-developed blossom-buds.

Gathering and Storing. Some few sorts of Pears require gathering at a particular time: otherwise, the fruits never acquire their proper flavour. The well-known Williams' Bon Chrêtien, for instance, becomes musky if allowed to hang too long, while it is juicy and excellent if gathered early enough. As a rule, most of the varieties are ready so soon as their fruits, on being lifted to a horizontal position, part readily from the spur. Many of the early sorts require gathering before they are so far advanced; others, ripening in succession, must be frequently examined, and gathered at the time experience suggests. Fine specimens should be laid on a little moss, in shallow baskets, and carried to the fruit-room, where they should be placed in single layers, on shelves. A cool, steady temperature is best suited for preserving fruit, and the atmosphere should be kept dry. To maintain a supply of ripe Pears, it is frequently necessary to adopt some method for hastening the ripening process, with a variety usually coming into proper condition at a later date, to supply a deficiency, maybe, a month previous. This may be successfully accomplished by packing some fruits in soft material, such as cotton wool or dry fern, and placing them in a warm cupboard, or drawer, not far from a fire. In winter, almost any late variety may be improved in flavour, as well as forwarded in ripening, by this simple process.

Pear-trees in Pots. This interesting method of culture is almost certain to succeed if only due attention is given to watering, and also feeding, after the fruits commence swelling. Mere protection from frost in any unheated glass house is all that is necessary in spring. About the beginning of June, the pots may be plunged in some prepared soil outside, into which the roots may be allowed to enter for the summer; in autumn, when repotting should be attended to, they may be cut off. For this system of culture, trees on the Quince are best adapted. They are often inclined to produce more flowers than could possibly be matured; in such instances, a large number of the weaker ones should be removed before expanding. For other remarks respecting fruit-tree culture in pots, *see* **Orchard House.**

SORTS. Varieties of Pears are extremely numerous, a large proportion of them being worthless, and unfit for any purpose whatever. It is, therefore, extremely important that reference should be given only to sorts that are worthy of cultivation: this aim has been kept in view in the preparation of the following list. It includes the varieties, with some additions, recommended as being worthy of cultivation, in an abridged statement, taken from the full Report of the Executive Committee of the National Pear Conference, held in the Royal Horticultural Society's Gardens, Chiswick, from 21st October to 4th November, 1885. This interim report was prepared by Mr. A. F. Barron, secretary to the committee, and published in the horticultural press during December of the same year. At the Pear Conference referred to, contributions were received from thirty-five of the English counties, also from Scotland, Ireland, Wales, and the Channel Islands. In addition, several large and meritorious collections were received from France. The report in question states that, "without entering into comparison of the merits of the different collections exhibited, it is important to notify this fact, that the cultivation of good Pears is not confined to any particular climate or district of the country." To confirm this, reference is made to noteworthy exhibits from Jersey, Kent, Hampshire, Sussex, Cheshire, and also from Scotland. The subjoined is added: "Nothing contributes so much to these successful results as good and careful cultivation. As a general rule, the best fruits

Pear—*continued.*

are produced where the greatest care is bestowed. An important factor in the successful cultivation of the Pear is, as gathered from the returns, in the use of the Quince stock, which, from its close, surface-rooting character, is more directly amenable to the attention of the cultivator." A considerable portion of the subjoined descriptions of Pears is translated, briefly, from Leroy's comprehensive and reliable work, the "Dictionnaire de Pomologie," which contains, doubtless, the most exhaustive treatment of the subject that exists.

Alexandre Lambré. Fruit medium, roundish-obovate; eye small, open; skin smooth, pale yellow, with small points of russet; flesh white, melting, and sometimes very rich. A very fine November Pear, but somewhat variable.

Althorp Crassane. Fruit medium, roundish-obovate; eye rather large, open; skin pale green, slightly flushed with brown-red; flesh white, juicy, buttery, with a pleasant flavour. October and November. A first-rate sort. The tree is hardy, vigorous, and bears well.

FIG. 49. PEAR AUTUMN [illegible].

Autumn Bergamot. Fruit rather small, roundish, somewhat [illegible]; eye small, open, set in a shallow depression; skin brownish-green on shady side, reddish-brown next the sun, covered with rough brown russet specks; flesh whitish, tender, slightly gritty at the core, juicy and richly flavoured. October. A good and very old sort. Vigorous growing and hardy. See Fig. 49.

Baronne de Mello. Fruit rather small, pyriform, rounding towards the eye; eye small, open; skin greenish-russet, entirely covered with brown russet; flesh greenish, juicy, buttery, and [illegible] flavoured. October. An excellent little Autumn Pear, of first quality.

FIG. 50. PEAR BEURRÉ BOSC.

Bellissime d'Hiver. Fruit large, roundish; eye large and [illegible]. November to April. One of the best culinary Pears.

Bergamotte Esperen. Fruit medium, roundish or Bergamot-shape; eye small and open; skin [illegible]. January and February. [illegible] a wall in [illegible] situations and [illegible].

Pear—*continued.*

Beurré Alexandre Lucas. Fruit large, handsome, obovate; skin greenish yellow russet, becoming yellow as it attains maturity; flesh white, juicy, melting, and good. A splendid sort, ripe in December.

Beurré Bachelier. Fruit large, irregular-obovate; eye small, closed; skin greenish yellow, with dark russet; flesh juicy, melting, and rich. December. Handsome and good.

Beurré Berckmans. Fruit medium, pyriform; eye open, almost level with the surface; skin pale yellow, strewn with numerous dots of russet; flesh juicy, white and pleasant. November. A nice-looking and excellent Pear. The tree is a good bearer.

Beurré Bosc. Fruit medium, long-pyriform; eye open, in a shallow basin; skin yellow, covered all over with orange russet; flesh white, melting, buttery, very rich. October and November. A handsome and excellent dessert Pear. The tree requires a wall in cold soils and situations. See Fig. 50.

Beurré Capiaumont. Fruit small, pyriform; eye large and open, level with the surface; skin yellow russet, flushed; flesh white, melting, and richly flavoured. October. A good cropper, and very hardy.

Beurré Clairgeau. Fruit large, curved-pyriform; eye small, open; skin smooth, yellow russet, flushed with bright red; flesh half-melting, sometimes gritty, but sweet. November. Showy and sometimes very good.

Beurré d'Amanlis. Fruit large, obovate, uneven in its outline; eye open, set almost even with the surface; skin at first of a bright green, becoming greenish yellow flushed with brownish-red; flesh tender, juicy, melting, and richly perfumed. September. One of the best early Autumn Pears.

Beurré d'Anjou. Fruit large, handsome, regular-obovate; eye small, open, set in a large and deep basin; skin greenish-yellow, with patches of russet, sometimes flushed with bright red; flesh juicy, melting, and richly flavoured. November. A very fine sort.

Beurré d'Aremberg. Fruit medium, pyriform; eye small, deeply set; skin yellow, covered with numerous regular patches of russet; flesh white, melting, very juicy, and agreeably flavoured. December and January. A good and well-known sort, and a great bearer. The tree may be grown as a standard or pyramid, but the fruit is much better from a wall.

FIG. 51. PEAR BEURRÉ STERCKMANS.

Beurré de Jonghe. Fruit medium, handsome, regular pyriform; eye small, open; skin golden-yellow, covered with dark orange russet; flesh greenish, melting, highly perfumed. December. An excellent sort.

Beurré de l'Assomption. Fruit very large, pyriform, bossed; eye large and open, almost level with the surface; skin lemon-yellow russet, with large patches of russet round the eye; flesh white, juicy, melting, and rich. A most delicious Pear, ripe in the middle of August. The tree is very fertile, and succeeds well on the Quince.

Beurré Diel. Fruit large, handsome, obovate; eye large, in an uneven basin; skin greenish-yellow, with numerous patches of russet; flesh juicy, very buttery, melting, and very rich. November and December. A Pear of great excellence. The tree is hardy, very vigorous, and an abundant bearer, either as a standard or against a wall. The branches should be kept well thinned.

Beurré Giffard. Fruit medium, short-pyriform; eye closed, in a shallow basin; skin greenish-yellow, flushed; flesh white, juicy, melting, highly flavoured. August. A very good early sort.

Beurré Hardy. Fruit large, obovate; eye large, open; skin [illegible], entirely covered with patches of [illegible] russet; flesh melting, juicy, and sweetly perfumed. October. A very delicious fruit. The tree is a strong grower and a good [illegible]. It forms a very handsome pyramid.

Beurré Rance. Fruit medium, pyriform; eye small, open; skin dark green, with numerous black russety spots; flesh white,

Pear—*continued.*

melting, very juicy, sometimes richly flavoured. February and March. A late and very valuable sort for dessert, succeeding as a bush or standard, or on a west wall. It should be double-grafted. The fruit does not always ripen; but it is also good for stewing.

Beurré Six. Fruit large, bossed, pyriform; eye small, open; skin smooth, greenish-yellow, with patches of russet; flesh very juicy, melting, and good. October.

Beurré Sterckmans. Fruit medium, short-pyriform; eye open, in a slight depression; skin yellow-russet, brightly flushed; flesh white, very juicy, melting, and rich. December. A fine-looking and excellent Pear. See Fig. 51.

Beurré Superfin. Fruit large, bossed, obovate; eye very small, closed; skin greenish-yellow, covered with reddish-russet; flesh white, juicy, buttery, melting, and delicately flavoured. October. A handsome and excellent fruit. One of the best Pears in cultivation.

Bishop's Thumb. Fruit medium, long-pyriform; eye small, open, level with the surface; skin greenish-yellow, with numerous patches of russet, sometimes flushed; flesh juicy, melting, and moderately flavoured. An old favourite sort, ripe in November.

Black Pear of Worcester. Fruit large, obovate; eye small, in a deep basin; skin rough, covered with very dark russety-brown. December to March. An excellent stewing Pear.

Bouvier Bourgmeister. Fruit medium, obovate; eye small, half-open; skin pale yellow, spotted with bright russet; flesh buttery, melting, juicy, of very excellent flavour. November.

British Queen. Fruit medium, short-pyriform; eye small; skin smooth, orange-yellow, slightly flushed; flesh juicy, melting, buttery, and rich. October. Quality at times somewhat variable.

Broompark. Fruit medium, roundish; eye small; skin dull greenish-yellow; flesh melting, juicy, buttery, with a rich, musky flavour. January. An excellent winter sort. Tree very hardy, vigorous, and an excellent bearer.

Caroline Hogg. Fruit medium, roundish, or Bergamot-shape; eye open, in a large basin; skin thick, brown-russet, flushed; flesh juicy, sweet, melting, and rich. December. A dessert Pear of first quality.

Catillac. Fruit very large, roundish; eye open, in a deep basin; skin green, with numerous small points of dark russet, flushed with brownish-red. One of the best culinary Pears in use all winter.

Chaumontel. Fruit rather large, short-pyriform; eye open, in a deep basin; skin rough, greenish-yellow, flushed; flesh buttery, melting, and richly flavoured, if grown in rich and warm soil. January. This sort is much grown in Jersey and Guernsey, where it succeeds perhaps better than anywhere else.

Citron des Carmes. Fruit medium, obovate; eye small, closed; skin green at first, changing to pale yellow, flushed with russet; flesh white, juicy, very melting, and sweet. July and August. One of the very best early sorts.

Clapp's Favourite. Fruit medium, regular-pyriform; eye large and open; skin greenish-yellow, with bright red; flesh white, juicy, rich, agreeably flavoured. August. A very delicious American Pear. The fruit must be eaten soon after being gathered.

Comte de Lamy. Fruit small, roundish; eye small, slightly depressed; skin greenish-yellow, flushed; flesh white, melting, juicy, and very pleasant. October. A dessert Pear of great excellence.

Conference Pear (Rivers'). Fruit large, long-pyriform, rounded at the apex; eye large and open; skin smooth and shining, dotted with russet; flesh yellow, with a salmon tint; stalk long. September and early October. Named after the National Pear Conference of 1885.

Délices d'Hardenpont. Fruit large, obovate, long, irregular; eye small and open; skin smooth, greenish-yellow, with pale russet; flesh white, melting, buttery, richly flavoured. November. A fine dessert Pear.

Deux Sœurs. Fruit large, irregular-pyriform; eye small and open; skin smooth, greenish-yellow, russety; flesh white, buttery, melting, very juicy, and finely perfumed. November. A remarkably fine Pear, of good quality.

Dorothée Royale Nouvelle. Fruit small, pyriform; eye open, in a small basin; skin pale yellow-russet, slightly flushed; flesh melting, juicy, with a delicious flavour. October and November. A very highly flavoured Pear.

Doyenné Boussoch. Fruit very large, obovate; eye open, in a small depression; skin pale yellow, with light russet; flesh white, juicy, melting, and rich. October. A very handsome Pear.

Doyenné Defays. Fruit medium, roundish-obovate; eye large and open; skin greenish-yellow, with reddish-russet on the side exposed to the sun; flesh very juicy, melting, and rich. December. A very delicious, late Pear. Tree hardy and a good bearer.

Doyenné du Comice. Fruit large, slightly bossed, obovate; eye small and open, in a deep basin; skin greenish-yellow, russet-flushed; flesh white, buttery, melting, very juicy, highly flavoured. November. One of the best Pears, requiring to be gathered early. The tree is a healthy grower and an excellent cropper; it forms a handsome pyramid on the Quince.

Pear—*continued.*

Doyenné Goubault. Fruit medium, short-pyriform; eye small, set in a deep basin; skin greenish-yellow-russet; flesh juicy, melting, and pleasant. January. A good winter Pear.

Dr. Hogg (Rivers'). Fruit small, obovate, even in outline; skin patched with russet, brownish-red where exposed, changing to bright red when ripe; eye open, set in a shallow depression; flesh melting, slightly gritty at the core, very juicy, and of singularly rich flavour. September. An enormous bearer; the fruit is best gathered a few days before it is ripe, and allowed to mature indoors. A seedling from GANSEL'S BERGAMOT.

Duchesse d'Angoulême. Fruit large, sometimes very large, much bossed, obovate; eye open, in a deep basin; skin greenish-yellow, with large patches of dull russet; flesh white, buttery, melting, and finely flavoured. October and November. A very fine, showy, and excellent Pear. Tree vigorous, healthy, and a good bearer on the Quince. The fruits of this variety are largely imported from France, to supply Covent Garden and other markets.

Duchesse de Bordeaux. Fruit medium, roundish; eye open, in a deep basin; skin brown-russet, flushed; flesh juicy, melting, and richly-flavoured. January. A late Pear, of great excellence.

Durandeau. Fruit large, regular-pyriform; eye small and open; skin dull, reddish; flesh white, melting, very juicy, with a pleasant perfume. November. Handsome and good.

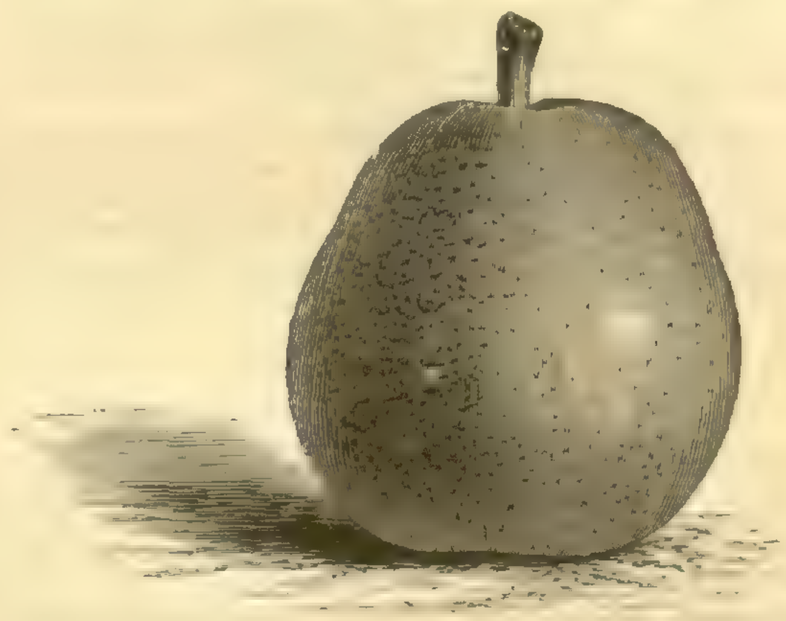


FIG. 52. PEAR EASTER BEURRÉ.

Easter Beurré. Fruit large, obovate; eye small, in a deep basin; skin dull green, with numerous dots of dull russet; flesh white, buttery, very juicy, and finely perfumed. January to March. One of the best late Pears. See Fig. 52.

Emile d'Heyst. Fruit medium, bossed, short-pyriform; eye small, set level with the surface; skin greenish-yellow, with patches of russet; flesh juicy, melting, with a rich, sugary flavour. October. A Pear of the highest merit, but it does not keep long.

Fertility (Rivers'). Fruit medium, obovate, greenish-russet, flushed; flesh firm, moderately juicy. October. A fine Pear for market.

Flemish Beauty. Fruit large, obovate; eye open, in a small depression; skin pale yellow, covered with patches of brown-russet, slightly flushed; flesh white, melting, and richly flavoured. October. A very excellent Pear; it should be gathered early.

Fondante d'Automne. Fruit medium, handsome, obovate; eye small and open; skin pale greenish-yellow, with patches of russet; flesh white, melting, very juicy and rich. One of the best October Pears. The tree is healthy, and a good bearer as a standard. It forms a handsome pyramid on the Quince.

Fondante de Malines. Fruit medium, roundish; eye small, in a deep basin; skin greenish-yellow-russet, slightly flushed; flesh white, juicy, melting, with the most delicious flavour. November and December. A Pear of great excellence.

Forelle. Fruit medium, short-pyriform; eye small, half-open; skin smooth, pale yellow, with small points of russet, brightly flushed with a fine vermilion-colour; flesh white, buttery, melting, and pleasant. November. A very fine-looking Pear. Tree hardy, and a good bearer.

Gansel's Bergamot. Fruit medium, roundish; eye small and open; skin greenish-yellow-russet, flushed; flesh white, juicy, rather gritty, with a fine aroma. November. A very excellent Pear, which requires a wall to bring its fruits to perfection.

Général Todleben. Fruit very large, irregular-pyriform; eye open, in a large basin; skin yellow, with large patches of brown-russet; flesh rosy, juicy, rather gritty, but melting, and with a pleasant flavour. December. A showy Pear, of good quality.

Gilles ô Gilles. Fruit large, roundish; eye open, in a deep basin; skin yellow, entirely covered with patches of dark orange-russet. October and November. A delicious stewing Pear.

Glou Morceau. Fruit large, irregular-obovate; eye open, in a deep basin; skin smooth, pale greenish-yellow with light russet; flesh white, melting, buttery, and finely flavoured. December. A Pear of great excellence. The tree succeeds as a standard in southern parts, but requires a wall in cold and exposed situations.

Pear—*continued.*

Grosse Calebasse. Fruit of immense size, pyriform; eye small, in a deep basin; skin pale grey-russet, slightly flushed. A good stewing Pear, recommended for its size.

Hacon's Incomparable. Fruit medium, roundish; eye small and open; skin greenish-yellow, with numerous spots of russet; flesh white, sweet, melting, and rich. December. An excellent dessert Pear. Tree hardy, good for a wall or an espalier.

Huyshe's Bergamot. Fruit large, oval; eye small and open; skin pale yellow, covered with brown-russet; flesh melting, juicy, with a sweet and fine flavour. November. A very delicious Pear.

Jargonelle. Fruit medium, pyriform; eye large and open, in a slight depression; skin smooth, greenish-yellow, flushed; flesh while, juicy, melting, and pleasant. August. One of the earliest dessert Pears, but it only keeps good a few days. The tree is vigorous, with a rather straggling, pendulous habit.

Jersey Gratioli. Fruit medium, roundish-obovate; eye open, in a small depression; skin greenish-yellow, with numerous points of russet, brightly flushed; flesh very melting, sugary, and pleasant. October. A fine-looking and first-rate Pear, keeping but a short time.

Joséphine de Malines. Fruit medium, short-pyriform; eye open, in a shallow basin; skin greenish-yellow with russet, flushed; flesh yellowish, with a tinge of red, very melting, juicy, and highly perfumed. January to March. A late Pear, of the highest merit. It succeeds well on the Quince, and is very prolific as an espalier or a bush.

Knight's Monarch. Fruit medium, roundish; eye small and open, in a bossed basin; skin greenish-yellow, with numerous points of russet; flesh very juicy, buttery, melting, and finely flavoured. December and January. A most delicious late Pear.

Louise Bonne of Jersey. Fruit medium, pyriform; eye small, in a deep basin; skin smooth, yellow-russet, brightly flushed; flesh white, buttery, melting, and rich. October and November. A very good and pretty Pear. The tree is a good bearer, and succeeds as a standard. It grows well on the Quince.

Madame André Leroy. Fruit very large, long-pyriform; eye large and open, in an uneven basin; skin greenish-yellow, with patches of grey-russet; flesh very melting, juicy, and highly flavoured. October and November. A very delicious and fine Pear, one of the best new sorts.

Madame Baptiste Desportes. Fruit large, slightly bossed, roundish; eye small and open, in a deep basin; skin yellow, with numerous dots and patches of russet; flesh very juicy, melting, with a fine perfume. October. A very excellent Pear.

Madame Treyve. Fruit large, bossed, obovate; eye small and open, in a deep basin; skin greenish-yellow, with numerous points of russet, brightly flushed; flesh white, melting, juicy, and very rich. September and October. A hardy and excellent sort, fruitful as a standard, and good for a wall. Succeeds as a pyramid on either the Pear or Quince.

Magnate (Rivers'). Fruit large, pyriform, even and symmetrical in outline; eye open, or nearly so, even with the surface; skin covered with dark brown-russet, mottled yellow where shaded; flesh yellow, melting, richly flavoured. October and November. Tree robust, hardy, stronger than LOUISE BONNE OF JERSEY, from which it is a seedling.

Maréchal de Cour. Fruit large, irregular-pyriform; eye large and open; skin pale yellow, thickly covered with patches of dull russet; flesh white, buttery, melting, with a sweet, rich flavour. October and November. A very fine and delicious Pear.

Marie Benoist. Fruit large, roundish; eye small, in a somewhat deep basin; skin greenish-yellow, entirely covered with brown-russet; flesh white, buttery, sweet, melting, and very juicy. January and February. A very good late Pear, large, and a good bearer.

Marie Louise. Fruit large, regular-pyriform; eye small and open, in a deep basin; skin greenish-yellow, with brown-russet; flesh white, buttery, and most richly flavoured. October and November. One of the most delicious Pears in cultivation. On a wall, the fruit attains a large size, and is invariably of good flavour.

Marie Louise d'Uccle. Fruit medium size, obovate; eye large and open, in a pretty deep basin; skin greenish-yellow, with brown-russet; flesh melting, very juicy, buttery, with a fine aroma. October. A good Pear, though not to be compared with MARIE LOUISE.

Maud Hogg. Fruit medium, obovate; eye open, in an irregular basin; skin covered with brown-russet, slightly flushed; flesh juicy, sweet, buttery, and rich. December.

Napoléon. Fruit large, obovate; eye almost closed, in a small basin; skin greenish-yellow, with numerous small points of russet; flesh white, tender, very juicy, melting, and sweetly flavoured. A most refreshing and good Pear, with fine aroma.

Ne Plus Meuris. Fruit medium size, very much bossed, roundish; eye half-open, generally prominent; skin greenish-yellow, with numerous dark russet specks; flesh white, juicy, melting, and richly perfumed. January to March. A very excellent late Pear.

Pear—*continued.*

Nouveau Poiteau. Fruit large, obovate; eye almost closed; skin greenish-yellow, freckled with russet; flesh white, melting, very juicy, with a fine flavour. November. A very good Pear, keeping only a short time.

Nouvelle Fulvie. Fruit medium, pyriform, very much bossed; eye almost closed, in a pretty deep basin; skin yellow, thickly covered with dull russet, sometimes flushed; flesh white, juicy, melting, with a rich perfume. November and December. A first-rate Pear. The tree is hardy, and grows well.

Olivier de Serres. Fruit medium, bossed, roundish; eye large, and closed, in a deep basin; skin dark orange-russety; flesh white, juicy, very melting, deliciously flavoured. January. A Pear of great merit.

Passe Colmar. Fruit medium, short-pyriform; eye open, in a wide basin; skin green, with numerous points of russet, changing to greenish-yellow-russet, flushed when it ripens; flesh very juicy, melting, most richly flavoured. November and December. A good and well-known dessert Pear. The tree succeeds admirably on the Quince as a bush or pyramid; it requires a wall in cold localities.

FIG. 53. PEAR PASSE CRASSANE.

Passe Crassane. Fruit medium, roundish-obovate; eye large and open, in a pretty deep basin; skin greenish-yellow, with numerous dots of brown-russet; flesh rather gritty, half-melting, but finely perfumed. January to March. One of the finest late Pears known. See Fig. 53.

Pitmaston Duchess. Fruit very large, irregular-pyriform; eye large and open, in a wide basin; skin greenish-yellow, with patches of dull russet, sometimes fine lemon-yellow colour; flesh white, melting, very juicy, and excellent. October and November. A very handsome Pear, of first quality. The tree grows well on the Pear, and also on the Quince, and succeeds as a standard, on a wall, as an espalier, or in an orchard-house.

Red Doyenné. Fruit medium, obovate; eye small and closed; skin greenish-yellow, entirely covered with reddish-russet, slightly flushed; flesh white, buttery, melting, and richly flavoured. November. An excellent dessert Pear.

Rousselet de Rheims. Fruit small, pyriform; eye small and open, almost even with the surface; skin greenish-yellow, freckled with russet, slightly flushed; flesh white, half-melting, juicy, with a delicious, refreshing perfume. September. A fine, early Pear, keeping but a short time.

Rousselet Enfant Prodigue. Fruit medium, irregular-obovate; eye large and open, in a somewhat deep and uneven basin; skin smooth, deep green, with numerous dots of russet; flesh not very melting, rather gritty, but juicy, and finely flavoured. November. A very nice acidulous Pear.

St. Germain. Fruit large, bossed, obovate; eye small, set in a bossed depression; skin greenish-yellow, with numerous markings of dark russet; flesh very juicy, melting, slightly gritty, richly flavoured. December and January. A good winter Pear.

Seckel. Fruit small, short-pyriform: eye small and open, level with the surface; skin brownish-red; flesh juicy, melting, with a rich aromatic flavour. October. A most delicious and much-esteemed little Pear. The tree bears well as a pyramid or standard on the Pear stock, or double-grafted, but does not succeed on the Quince.

Soldat Laboureur. Fruit large, irregular-pyriform; eye large, almost closed; skin pale yellow, covered with small points of russet; flesh juicy, melting, buttery, and pleasant. November.

Souvenir du Congrès. Fruit very large, bossed, pyriform; eye large and open, in a deep basin; skin yellow, covered with reddish russet; flesh tender, melting, juicy, with a rich vinous flavour. September. A delicious Pear, highly esteemed; excellent on a wall.

Suffolk Thorn. Fruit medium, roundish; eye small and open, in a deep basin; skin pale yellow, covered with grey russet; flesh white, juicy, very melting, and finely flavoured. October. A first-rate Pear.

Pear—*continued.*

Summer Beurré d'Aremberg. Fruit small, even-turbinate; eye small, very deeply set; skin yellow, with numerous points of reddish-russet; flesh juicy, melting, very buttery, highly perfumed. September. An excellent, refreshing Pear.

Summer Doyenné. Fruit small, roundish; eye small, partly closed; skin yellow, freckled with russet, brightly flushed; flesh white, very juicy, melting, and sweetly flavoured. August. One of the best early sorts.

Swan's Egg. Fruit medium, roundish; eye small, almost closed; skin green, with numerous dots of dull russet; flesh greenish, juicy, melting, and pleasantly flavoured. November. A very old and esteemed Pear. Succeeds well as a standard.

Thompson's. Fruit medium, short-pyriform; eye open, in a small depression; skin yellow, with numerous dots of reddish-russet; flesh white, very juicy, buttery, melting, and richly flavoured. November. One of the best English Pears. The tree succeeds double-grafted and bears profusely. It forms a good standard, and is also adapted for a wall or an espalier.

Triomphe de Jodoigne. Fruit large, obovate; eye open, almost level with the surface; skin yellow, covered with small points of russet; flesh white, melting, juicy, and good. December. A handsome and excellent Pear.

Urbanistes. Fruit medium, obovate; eye small and closed, in a deep basin; skin pale yellow, freckled with russet, slightly flushed; flesh white, juicy, melting, and pleasantly flavoured. October and November. A most delicious Pear, which requires a wall; it is not a good bearer, unless under favourable conditions.

FIG. 54. PEAR UVEDALE'S ST. GERMAIN (Small Fruit).

Uvedale's St. Germain. Fruit very large, irregular-pyriform; eye large and open, almost level with the surface; skin smooth, dark green, brightly flushed. A delicious stewing Pear, sometimes weighing over 2lb. See Fig. 54.

Van Mons Léon Leclerc. Fruit large, uneven-pyriform; eye open, in a shallow basin; skin green, with light russet; flesh white, melting, very juicy, and rich. November. A fine Pear, deliciously flavoured. The tree succeeds double-grafted, or on the Pear stock, and requires a wall, except in warm climates.

Verulam. Fruit large, obovate; eye open, in a shallow basin; skin dark orange-yellow, entirely covered with dots of dull russet. December till March. A very fine stewing Pear.

Vicar of Winkfield. Fruit large, long-pyriform; eye small and open; skin greenish-yellow, with numerous dots of pale russet; flesh white, half-melting, juicy, and pleasant. November to January. A tolerably good stewing Pear. It requires a warm situation.

White Doyenné. Fruit medium, regular-obovate; eye small and closed; skin smooth, greenish-yellow, brightly flushed; flesh white, melting, juicy, and finely flavoured. October. One of the finest autumn Pears.

Williams' Bon Chrêtien. Fruit large, irregular-pyriform; eye open, set in a shallow depression; skin smooth, fine, pale yellow; flesh white, tender and melting, of delicious flavour. August and September. A dessert Pear of great excellence; it keeps but a short time. The tree succeeds as a standard, pyramid, or bush, and is very fertile on either the Pear or Quince. See Fig. 55.

FIG. 55. PEAR WILLIAMS' BON CHRÊTIEN.

Winter Nelis. Fruit small, roundish; eye open in a shallow basin; skin greenish-yellow, much covered with dull, russety dots; flesh melting, juicy, and rich. November and December. One of the richest-flavoured Pears.

Zéphyrin Grégoire. Fruit medium, roundish; eye very small, almost level with the surface; skin greenish-yellow, with pale russety points; flesh white, very juicy, melting, and deliciously perfumed. December and January. A very excellent winter Pear.

Selections of Sorts.

For Culture on Walls. Bergamotte Esperen, Beurré Bosc, Beurré d'Aremberg, Beurré Diel, Beurré Rance, Beurré Sterckmans, Beurré Superfin, Chaumontel, Doyenné du Comice, Duchesse d'Angoulême, Easter Beurré, Forelle, Gansel's Bergamot, Général Todleben, Glou Morceau, Hacon's Incomparable, Jargonelle, Joséphine de Malines, Louise Bonne of Jersey, Madame Treyve, Marie Louise, Napoléon, Ne Plus Meuris, Passe Colmar, Pitmaston Duchess, Souvenir du Congrés, Thompson's, Urbanistes, Van Mons Léon Leclerc, Winter Nelis.

For Pyramids, Bushes, &c., in the Open Ground. Alexandre Lambré, Althorp Crassane, Baronne de Mello, Bergamotte Esperen, Beurré Bosc, Beurré Capiaumont, Beurré Clairgeau, Beurré d'Amanlis, Beurré d'Aremberg, Beurré Diel, Beurré Rance, Beurré Superfin, Comte de Lamy, Doyenné du Comice, Duchess d'Angoulême, Easter Beurré, Flemish Beauty, Fondante d'Automne, Forelle, Glou Morçeau, Knight's Monarch, Louise Bonne of Jersey, Maréchal de Cour, Marie Louise, Ne Plus Meuris, Passe Colmar, Pitmaston Duchess, Souvenir du Congrés, Williams' Bon Chrêtien, Winter Nelis, Zéphyrin Grégoire.

For Standards. Althorp Crassane, Autumn Bergamot, Beurré Capiaumont, Beurré d'Amanlis, Beurré Diel, Beurré Rance, Beurré Superfin, Bishop's Thumb, Broompark, Citron des Carmes, Comte de Lamy, Fertility, Fondante d'Automne, Knight's Monarch, Louise Bonne of Jersey, Marie Louise, Marie Louise d'Uccle, Seckel, Suffolk Thorn, Swan's Egg, Williams' Bon Chrêtien, Winter Nelis.

Best Stewing Pears. Black Pear of Worcester, Catillac, Uvedale's St. Germain, Verulam.

FUNGI. Comparatively few Fungi have been recorded in Britain as found on Pear-trees, except those that grow on the fruit, and some on branches and leaves, mostly after these parts have been dead for some time. It is unnecessary here to deal with the latter Fungi; although it is not unlikely that some of them, in their early stages of growth, live in the tissues of the Pear-trees. Of such as grow on living leaves or branches, one of the most important is that known as *Roestelia cancellata* (see Fig. 56), which causes the leaves to become covered with large, raised spots, or patches, at first yellow, but soon becoming red. These spots are visible on both surfaces, but they are deeper-red above, and are encircled with a broad, dark border. On the lower surface may be seen, on each patch, a variable number of ovate bodies, about $\frac{1}{8}$in. high, and rather less in breadth. These are

Pear—*continued.*

called peridia, and contain minute, nearly globular, simple spores, which escape, when mature, through fine slits in the sides of the peridia. This Fungus cannot be called common in England, and it has not been recorded from Scotland; but in many Continental localities, it is so abundant as to do much injury to the trees.

FIG. 56. PEAR LEAVES ATTACKED BY ROESTELIA CANCELLATA (believed to be a stage in the development of *Gymnosporangium Sabinæ*)—*a*, Upper Surface, and *b*, Lower Surface, of Leaf; *sp*, Spot on Upper Surface, surrounded with dark border; *p*, Spot on Lower Surface, bearing Peridia, as described in the text.

Some years ago, the Danish botanist, Oersted, made investigations into the development of this Fungus, which led him to the result, now very generally accepted by botanists, that it is only a stage in the life-history of a Fungus which was regarded in former times as entirely disconnected with the *Roestelia*, and which grows on the branches of certain species of *Juniper*, notably of the Savin (*J. Sabina*). This latter Fungus, known as *Podisoma fuscum*, Cda., or *Gymnosporangium fuscum*, DC., induces a thickened state of the branches of its host. From this project numerous cylindrical or bluntly conical

FIG. 57. JUNIPER TWIG ATTACKED BY GYMNOSPORANGIUM FUSCUM—*c*, Outgrowths, in which Spores are formed.

outgrowths, often ¾in. to 1½in. long (see Fig. 57, *c*). These outgrowths are at first yellow, but become brown; and, when moistened, they assume the consistence of jelly. The microscope shows that they are made up of colourless, one-celled filaments, imbedded in the jelly, and running from within outwards, each of which bears at its tip a small spore of an elliptical or biconical form, with a division wall in the middle, so that it is made up of two cells, base to base, as in *Puccinia*. The spores lie on the surface of the body, and, when it dries,

Pear—*continued.*

they are blown about by the wind. When one germinates, it forms one or two filaments, made up of a row of cells; and from each of the cells, from the tip of this for a little way down, a branch grows, and forms on its tip a minute sporidium. These are believed, when they fall on Pear leaves, to give rise to the *Roestelia cancellata*. The spores of this, in turn, are now believed to be the cause of the *Gymnosporangium*, when they fall on the proper hosts. This phenomenon of a complex cycle, believed to exist, peculiarly well marked, in many species of **Puccinia**, is further referred to under that heading. The diseased Pear leaves should be removed and destroyed as soon as they show well-marked signs of the Fungus, and before the spores are scattered from them. The species of *Juniperus* that nourish *Gymnosporangium* should not be permitted to grow near Pear-trees, especially if the Fungus shows itself on the Juniper bushes.

In August of 1885, a communication was made to the American Association for the Advancement of Science, by Mr. J. C. Arthur, regarding the cause of the disease known as Pear Blight. This disease attacks Apple as well as Pear trees, and causes the death of the diseased parts. A yellowish, viscid substance is formed, apparently at the expense of the starch in the branch or other part attacked. Prof. Burrill found that the diseased tissues invariably contained a microscopic Fungus, named by him *Micrococcus amylovorus*, belonging to the group of *Schizomycetes*, so prominent of late years as the causes of disease in man and in domestic animals. Mr. Arthur has made numerous experiments, which have convinced him that the *Micrococcus* is the direct cause of Pear Blight. Cure of the disease, after it is once established in a branch, seems impossible; but prevention of its spread should be aimed at, by the removal and burning of all parts that show any signs of the disease. Infection of healthy plants is easily accomplished if cracks or wounds on their surface are brought into contact with any of the diseased tissues.

"Cracking" in Pears, and in Apples, may be due to more than one cause; but one of the worst forms is the work of a Fungus, which, on Pears, has been called *Fusicladium pyrinum*, Fckl., but is now generally referred, as a variety, to *F. dendriticum*, Fckl., now more often called *Cladosporium dendriticum*, Wallr., which, in its typical state, grows on Apples. This Fungus grows on the leaves and young twigs, and also on all parts of the flowers, often preventing the fruits from setting; and if they do set, they are crippled and injured in growth, and are rendered of little value by the Cracking of the skin of the fruit as it ripens. On the leaves, the Fungus gives rise to black spots, from ¼in. to ½in. across, branching from the centre like a minute tree, whence the name *dendriticum*, or tree-like. On the fruit, it gives rise to similar spots, which very soon become irregularly rounded, with a narrow, white margin, surrounding a depressed black spot. Around the white margin there is a dark border, due to the spreading mycelium of the Fungus. On examining the spots with a low magnifying power, it is evident that the margin is the edge of the epidermis or skin of the fruit, and that the dark, depressed spot is occupied with a mass of minute bodies. On using a lens of higher power, it is seen that these bodies are the ends of club-shaped or narrowly-ovate, brown spores, or conidia, which are fixed by the narrow end to the tip and sides of erect, short stalks. The conidia are simple, or are occasionally two-celled. The stalks are produced on the surface of a mass or stroma of closely-packed small cells, formed by division of the threads of the mycelium by cross walls. The mycelium does not penetrate far into the fruit. It remains almost wholly in the cells of the epidermis, and between them and the next layer; though a few branch-threads are

Pear—*continued.*

pushed inwards also. The spots are apt to run together; and, in bad cases, they may cover a large part of the surface of the fruit. Sometimes they do not develop conidia, but the short cells of the stroma may break off, and may act as conidia, since they push out mycelium threads, and reproduce the Fungus. This condition is *Spilocæa pomi*, of Fries. The Fungus continues to grow on the fruit after it is gathered and stored, and greatly diminishes its marketable value, both by rendering it unsightly, and by causing decay. The variety *pyrinum* differs from the form on Apples chiefly in the rather less regular form of the conidiophores or stalks. Remedies must be directed to prevention, since no means are known to effect a cure. Diseased trees, and also those fruits that assume the diseased condition in the storehouse, should be destroyed. Certain varieties are peculiarly liable to injury from this Fungus, *e.g.*, the Louise Bonne, and should not be planted where liable to infection from it. Mr. Smee has recommended as a remedy to lift the trees, and give them some good top-spit loam.

Still another Fungus, destructive to the fruits of Pears, and also hurtful to Apples, Plums, Cherries, and Apricots, is that now frequently called *Oidium fructigenum*, Lk. It has also received the names of *Torula fructigena*, *Monilia fructigena*, *Oospora fructigena*, and *Acrosporium fructigenum*; and, under one or other of these names, it has been often noticed as injuring the fruits of Rosaceous trees. It breaks through the epidermis of the fruits in the form of small, yellowish-white, convex masses or tufts of closely-packed, erect filaments. These tufts are often grouped in concentric fashion. The filaments, under the microscope, prove to be made up of rows of bead-like cells, which tend to separate from one another, and become elliptical or ovate, and act as conidia, germinating on any suitable food. The filaments branch freely, both near the tips and along the sides. Pears and Apples usually show only diseased patches; but Plums, at times, are so diseased that they become entirely white, or yellowish-white. The mycelium has been noticed on half-grown fruit on the trees, but the tufts in general appear abundantly only on the ripe fruits, especially on such as fall, and lie for some time on the ground. It has been observed that the presence of this Fungus on the fruits renders the latter less liable to rot; and this has been explained by the fact that the Fungi that cause rottenness find the fruits less favourable for their nourishment after the growth of the *Oidium*. That it injures the fruits, however, cannot be doubted, and they are rendered less suitable for man's use; yet this Fungus can scarcely be classed among the very injurious species. Remedies against it must be very much the same as against *Cladosporium dendriticum*; no cure is yet known.

INSECTS. The Pear-tree is the food-plant of numerous insects, but only a comparatively small number of species ever do serious damage. All parts of the tree are liable to be attacked. The roots, as in most trees, are at times cut through by Mole Crickets, grubs of Cockchafers, and other subterranean foes. For remedies, *see* **Mole Cricket** and **Cockchafer.**

The trunk is bored into, especially in trees that have become sickly from any cause, by beetles (*see* **Scolytidæ**), and by the larvæ of certain moths, of which the most hurtful are the Leopard Moth, the Goat Moth, and the Red-belted Clearwing (*see* **Sesia**). The last species (*Sesia myopæformis*) hardly resembles a moth, as the wings are narrow, and not scaly over most of their surface, while the body is rather slender, and black, with a bright red belt round the middle of the abdomen. The spread of wings is about $\frac{3}{4}$in. The larvæ are sometimes very numerous. There is no satisfactory method of curing trees severely attacked by beetles, or

Pear—*continued.*

by other insects, where the larvæ live between the bark and the wood, or in the wood. The mature insects should be caught and destroyed, so far as practicable; and, if there are signs that the insect-tenanted part is of small extent, it may be advantageous to cut out the bark, or the wood, in which the insects live; but this can seldom be done. In the case of the **Goat Moth** and the **Leopard Moth**, the suitable treatment is given under their respective headings. It is sometimes well to uproot and destroy the tree while the larvæ are in it, in order thereby to prevent them from spreading to adjoining trees. The loss is diminished by the fact that trees inhabited by insects in bark or wood are, as mentioned above, usually in a sickly state. If it is desired to preserve the tree, it ought to be stimulated in every practicable way to active growth; as it may thus be enabled to resist its parasites, and to repair the injuries it has suffered. Perhaps washes of soft soap, or of lime, or of other substances disagreeable to insects, might protect the parts subject to attack at the time when the insects are laying their eggs.

The younger branches are frequently attacked by the Pear Oyster Scale (*Aspidiotus ostreæformis*). For an account of the treatment suited for the removal of this pest, which frequently proves very hurtful, *see* **Scale Insects.** It is the female that is present on the branches, like a minute oyster-shell, about $\frac{1}{17}$in. across, slightly convex, wrinkled, and grey or reddish. When this scale is removed, the female is seen, rounded or heart-shaped, pale yellowish, and unprovided with limbs. The male is smaller, is ochreous in colour, and has two wings, long antennæ, and six legs. Washing the branches with soft soap and hot water, in winter, will usually remove these Scale insects. Painting the branches with linseed oil, or with paraffin, has also proved successful.

The leaves are preyed upon by numerous insects. While young, they are gnawed by *Otiorhynchus raucus*, and by other Weevils (*see* **Rhynchites**). For remedies against these insects, *see* **Otiorhynchus.**

The greater part of the insect foes of the Pear-tree belong, however, to the *Lepidoptera*. The larvæ of not a few species feed on its leaves. Occasionally, those of the large Tortoiseshell Butterfly (*Vanessa polychloros*), and of the Black-veined White Butterfly (*Aporia Cratægi*) (*see* **Hawthorn Caterpillars**), eat the leaves; but far more hurtful are those of the Lackey Moth (*Bombyx neustria*), and of the species of *Liparis*. A few species of the *Noctuæ* are injurious to the Pear-tree, one of the more striking in appearance being the larva of the Dagger Moth (*Acronycta psi*), which bears a black-pointed, fleshy hump on the back of the fifth ring of the body, breaking a broad, yellow, black-bordered, median, dorsal band. The other *Noctuæ*, the larvæ of which are likely to be found on the tree, are less noticeable. Those of several Geometer Moths feed on Pear-leaves, as well as on other trees. Among the more destructive are the species of *Hybernia*, and the Winter Moth (*Cheimatobia brumata*). A good many of the *Tortricina* (*see* **Moths**) also live on the Pear-tree, and, like the Geometers, they almost all live between leaves spun together, or rolled into a tube: hence, they are protected from birds and other foes. Mention is here made of the scientific names of only a few of those known to live on this tree, viz., *Tortrix ribeana*, *Lozotænia rosana*, *Hedya ocellana*, *Dictyopteryx contaminana*, and *Crœsia holmiana*. Of the *Tineina* (*see* **Moths**), a few live in the leaves, burrowing in their substance, *e.g.*, *Coleophora hemerobiella*.

Beyond capturing the mature insects when possible, little can be done for prevention of ravages by larvæ on Pear-trees, except as regards the Winter Moths, the wingless females of which may be checked on their way

Pear—*continued.*

from the soil up the tree, by a belt of sticky material round the tree-trunk. If the tree is trained, the wall, or the support, should also have a belt of the same substance. The larvæ of the butterflies, and of the larger moths, should be picked off and destroyed. The larvæ of the Tortrices and Geometers may be either picked off or shaken into an old sheet, or other cloth, and should be swept up and destroyed at once. Leaf-miners can be killed by pressure with finger and thumb, but the harm done by them is, as a rule, too slight to render this labour necessary. Certain Sawflies are very hurtful to fruit-trees, and, among others, to the Pear-tree. The worst of these foes is the Slugworm, or larva of *Eriocampa limacina*. For an account of the injuries done by it, and remedies, *see* **Slugworms.**

Mr. Buckton, in his "Monograph of British Aphides," mentions *Aphis pyraria* and *A. lentiginis* as obtained by him from Pear-trees in England, and says that the former was so abundant on one tree as to entirely cover it with excretions. Other kinds have been recorded by various entomologists. All the Aphides may be treated in the same way. *See* **Aphides.** To the allied genus *Psylla* belong several species that feed on the Pear, and the following have been recorded from Britain: *P. pyrisuga*, Först., *P. apiophila*, *P. pyricola*, and *P. simulans*.

FIG. 58. PSYLLA PYRISUGA (the Line below the Insect shows the natural length).

Of these, *P. pyrisuga* (see Fig. 58) is probably the most hurtful. In Ormerod's "Manual," it is named *P. Pyri*, Schmidb., and is also called the Pear Sucker. The female is ⅛in. long, and is not very unlike a Frog Hopper in form; but the wings are transparent. It is able to leap considerable distances, by means of the large thighs of the hindmost pair of legs. It is usually at first of a greenish colour, with red eyes; but it becomes, in a short time, variegated with carmine-red, brown, and black, and these colours extend to the base of the wings, and to the legs. The insects live on juices of the plants they infest, drawing them in through a beak, which, when at rest, lies close against the breast. The

FIG. 59. LARVA OF PSYLLA PYRISUGA (the Line shows the natural length).

male is about ⅛in. long. The larvæ (see Fig. 59) and pupæ, as well as the mature insects, live upon Pear-trees, and, occasionally, upon Apple-trees also. They suck the juices from the leaves, and from the young shoots, and discharge their sticky excretions over all parts of the trees. They are thus hurtful both by withdrawing the sap, and by clogging the surfaces of leaves and twigs, so that these parts are unable to assist in nourishing the plant. The mature insects usually pass the winter sheltered in crevices under bark, &c. A remedy found serviceable is to apply tobacco infusion, soapsuds, or the other solutions employed against **Aphides** (which *see*).

Pear leaves are sometimes severely injured by Gall

Pear—*continued.*

Mites, which give rise to blistered spots in them (see Fig. 60). These blisters are small, and, at first, yellowish or red; but, in a short time, they tend to become brown, and then they dry up, and fall out of the leaf, if pressed on, while the rest of the leaf may still be apparently healthy. Very often, the blisters are so numerous that many of them unite, and the leaf may become covered with them over almost the whole surface. In severe cases, almost every leaf on a tree may

FIG. 60. PEAR-LEAF ATTACKED BY PHYTOPTUS PYRI—*a*, Leaf recently attacked by Mites; *b*, Leaf with old Mite Galls.

be more or less injured, and many of them destroyed, so that the trees are much weakened. Moreover, the animals shelter themselves in the buds in winter, and a tree, when once infected, continues to suffer year after year. A microscopic examination of a section taken

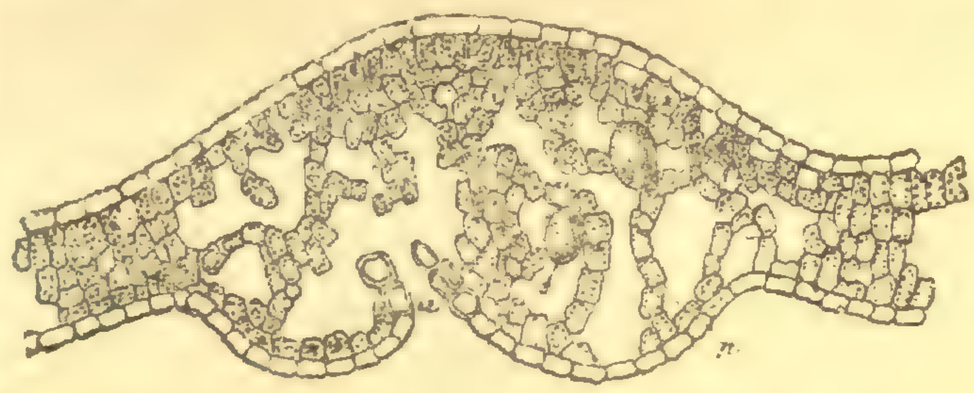


FIG. 61. BLISTER FORMED ON LEAF BY PHYTOPTUS PYRI—*a*, Opening of Gall; *p*, Tissue of Leaf altered by Mites; *e*, Egg of Mite.

from a blister (see Fig. 61) shows that the cells in the middle of the leaf become torn asunder, so as to leave air-spaces larger than before; and the surfaces of the leaf are thus pushed farther apart. In the middle of the blister, on its lower surface, is a small opening, which permits the Mites to pass out of the blister. These animals are named *Phytoptus Pyri*. *See* **Mites.**

It is so difficult to completely effect a remedy, that it is not advisable to give the labour, save in the case of trees of peculiar value; and it is preferable to burn the diseased trees, to prevent the evil spreading. To destroy the Mites, the most successful course is, at the moment

Pear—*continued.*

when the young leaves are forming on the new summer shoots, to cut off the diseased leaves formed in spring, and burn them, since, at this period, almost all the Mites will be in the galls in these leaves. It is of little use to attempt a remedy at other seasons, or to employ other means.

The flowers and the young fruits occasionally suffer from *Anthonomus pomorum* (*see* **Apple-blossom Weevil**); and the Pears are eaten into by the larva of *Carpocapsa pomonana* (*see* **Apple or Codlin Grub**), and by Woodlice.

PEAR, ALLIGATOR. *See* **Persea gratissima.**

PEAR, ANCHOVY. *See* **Grias.**

PEAR, AVOCADO. *See* **Persea gratissima.**

PEARCEA. Included under **Isoloma** (which *see*).

PEAR, GARLIC. *See* **Cratæva.**

PEARL FRUIT. *See* **Margyricarpus.**

PEARL WEED, or **PEARL WORT.** A common name for **Sagina** (which *see*).

PEAR, PRICKLY. *See* **Opuntia.**

PEAR-SHAPED. Obovoid or obconical, with a tapering base.

PEAR SLUG. The larva of *Eriocampa limacina* (*see* **Slugworms**). It is also called Plum Slug, and is named after several other plants in like manner, as it feeds on a number of fruit-trees and shrubs. For description and remedies, *see* **Slugworms.**

PEA, SWEET. *See* **Lathyrus odoratus.**

PEAT. Bog earth.

PEA-TREE. *See* **Sesbania.**

PEA-TREE, SIBERIAN. *See* **Caragana.**

PEA WEEVIL. *See* remarks on INSECTS, under **Pea.**

PEBBLE MOTH. *See* **Pionea forficalis.**

PECAN NUT-TREE. *See* **Carya olivæformis.**

PECTINATE. Pinnatifid, with numerous, closely-placed, narrow segments, resembling the teeth of a comb.

PECTIS (from *pecten*, a comb; referring to the pappus). Including *Laurentea*. ORD. *Compositæ*. About forty species have been referred to this genus, but the number may be reduced. They are greenhouse or half-hardy, annual or perennial herbs, sometimes diffuse or prostrate, sometimes erect, slender, and glabrous, and are found in the warmer parts of America, from Brazil or Bolivia as far as Mexico. Flower-heads yellow (or white), small or mediocre, often narrow, slender-stalked or sessile, solitary or corymbose; involucre of a single row of bracts; receptacle small, naked; pappus bristly or scaly. Leaves opposite, usually narrow and entire, and furnished with pellucid dots. The species have but little horticultural value, although the under-mentioned is worth cultivating. It requires treatment similar to other half-hardy annuals.

P. angustifolia (narrow-leaved). *fl.-heads* yellow, fragrant. *l.* coarsely ciliate, linear. *h.* 4in. to 6in. North-west America, 1865. A branching, half-hardy annual, with a compact habit and dense inflorescence. (B. M. 6286.)

PEDALINEÆ. A small natural order of annual or perennial herbs, rarely sub-shrubs, with vesicular glands, natives of the warmer regions of the globe, but most abundant in Africa. Flowers hermaphrodite, irregular, those of Old World genera axillary, solitary, or rarely fasciculate; those of American genera disposed in terminal racemes, shortly or very shortly pedicellate; calyx gamosepalous, parted nearly to the base into four, rarely five, segments, or rarely membranous, five-fid, and spathe-like; corolla gamopetalous, tubular, often oblique or decurved at base, and more or less oblique at back; limb of five spreading lobes, usually bilabiate, imbricated; stamens alternating with the corolla lobes, usually included. Fruit capsular, nut-like, or rarely sub-drupaceous.

Pedalineæ—*continued.*

Leaves opposite, or the upper ones alternate, entire, toothed, incised, or pedatifid. Sesamum or Gingilie Oil, largely used by Orientals, is extracted from the seeds of *Sesamum indicum* and *S. orientale*; but the species, generally speaking, have not much economic value. The order comprises a dozen genera, and only about forty species. Illustrative genera are: *Martynia*, *Pedalium*, *Pterodiscus*, and *Sesamum*.

PEDALIS. In length, 1ft.

PEDALIUM (from *pedalion*, a rudder; in reference to the dilated angles of the fruit). ORD. *Pedalineæ*. A monotypic genus. The species, *P. murex*, a native of India and tropical Africa, is probably now lost to cultivation. It is a sparingly-branched, glabrous annual, with opposite or alternate, stalked leaves, from the axils of which spring the solitary, sub-erect, shortly-stalked, yellow flowers.

PEDATE, PEDATIFID. Resembling a bird's foot; palmately parted or divided, with the lateral divisions cleft into smaller segments. A Pedate leaf is shown at Fig. 62.

FIG. 62. PEDATE LEAF.

PEDATIPARTITE, PEDATISECT. Pedately parted in such a manner that the segments become distinct leaflets.

PEDICEL. The support of a single flower; the last branch of the inflorescence.

PEDICULARIS (from *pediculus*, a louse; it was supposed to cause sheep to be infested with that insect). Lousewort. ORD. *Scrophularineæ*. Of this genus, above 120 species have been enumerated; they are mostly hardy perennial (rarely annual?) herbs, broadly dispersed, but mainly in the Northern hemisphere. Flowers in bracteate spikes or racemes, honeyed, often secund; calyx tubular or campanulate, two or five-toothed; corolla with a cylindrical or swollen tube, and a bilabiate limb, the upper lip of which is galeated. Leaves alternate or whorled, very rarely sub-opposite, once or much-pinnately divided, rarely simple and toothed; floral ones decreasing, mostly bract-like. Some of the species are pretty little plants; they succeed if planted in a moist, peaty soil, and are propagated most readily from seeds. A selection of the species best known to cultivation is given below; they are hardy perennials, except where otherwise indicated. Most of the species are not long-lived in cultivation; they are probably all more or less parasitic on the roots of other plants.

P. canadensis (Canadian). Wood Betony. *fl.* wholly cream-colour, or with the obtuse, bidentate galea of the corolla purple; calyx hairy. July and August. *l.* pinnatifid, with obtuse, crenated segments. Stem simple. *h.* 6in. to 12in. North America, 1780. (B. M. 2506; S. B. F. G. 67.)

P. comosa (tufted). *fl.* usually cream-coloured, in a short, dense spike; galea of corolla obtuse, bidentate. July and August. *l.* pinnate; leaflets pinnatifid and toothed. Stem simple, downy. *h.* 6in. to 2ft. Eastern Europe, &c., 1775.

P. dolichorhiza (long-rooted).* *fl.* golden-yellow, in a terminal spike; upper lip of corolla curved down into a short, straight beak; lower lip trilobed. Summer. *l.* pinnate, with toothed leaflets. *h.* 1ft. to 1½ft. Eastern Europe, &c., 1884. A pretty plant. (R. G. 1884, p. 54.)

P. flammea (flame-coloured).* *fl.* pale red; galea of corolla very blunt, rounded. May and June. *l.* pinnate; leaflets roundish, imbricated backwards, doubly toothed. Stem simple. *h.* 6in. to 12in. Arctic Norway, Iceland, &c., 1775.

P. flava (yellow). *fl.* yellow, striped with red; calyx woolly; galea of corolla obtuse, very convex, bidentate. July. *l.* fleshy, deeply pinnatifid, with distant, oblong, coarsely and doubly-toothed segments. Stem simple. *h.* 6in. Siberia, 1828.

P. foliosa (leafy). *fl.* cream-colour, in a dense spike; galea of corolla downy or glabrous, very blunt. July. *l.* pinnatifid, with lanceolate, unequally-toothed segments. Stem simple, short and almost naked, or tall and leafy. *h.* 6in. to 3ft. Europe, 1786. (J. F. A. 139.)

P. incarnata (flesh-coloured). *fl.* pale red; calyx hoary-pubescent; galea of corolla with an obtuse or emarginate, falcate beak. June

Pedicularis—*continued.*

and July. *l.* deeply pinnatifid, with unequally-toothed, linear-lanceolate segments. Stem simple. *h.* 1ft. Europe, &c., 1796. (J. F. A. 140.)

P. megalantha (large-flowered). *fl.* yellow; corolla large, with a tube twice as long as the calyx; beak of galea proboscis-like, twisted and trifid; pedicels and calyces villous. June. *l.* pinnatifid, with oblong or ovate, pinnatifid or serrate segments. Stem simple. *h.* 6in. to 12in. Himalayas, 1836. (R. G. 943.)

P. palustris (marsh-loving). *fl.* dull pink; upper lip of corolla obtusely three-lobed, lower broad. May to September. *l.* 1in. to 3in. long, linear-oblong, pinnate; segments oblong, crenate, obtuse or pinnatifid, the ultimate ones rounded. Stem stout, erect, branched above. *h.* 6in. to 18in. Europe (Britain). (F. D. 2055; Sy. En. B. 996.)

P. recutita (circumcised). *fl.* purple, in a compact, leafy spike; calyx sometimes hairy; galea of corolla very blunt. July and August. *l.* pinnatifid, with deeply-toothed segments. Stem simple. *h.* 1ft. to 1½ft. Central Europe, 1787. The habit of this species is singular, the leaves being collected under the spike. (J. F. A. 258.)

P. rostrata (beaked). *fl.* purple, borne in a few-flowered raceme; galea of corolla falcately beaked, the beak truncate at apex. July and August. *l.* pinnate; leaflets or segments pinnatifid. Stem declinate. *h.* 3in. to 9in. Western Europe, 1819. (J. F. A. 205.)

P. Sceptrum-Carolinum (Charles's Sceptre).* *fl.* golden-yellow, twin or tern, disposed in an interrupted spike; corolla 1in. long, the lower lip tinged with purple or blood-colour. August. *l.* pinnatifid, with ovate, crenulated lobes. Stem few-leaved. *h.* 3ft. to 4ft. Europe, 1793. (F. D. 26.)

P. spicata (spicate-flowered). *fl.* purple, disposed in a dense, elongated spike; galea of corolla straight, obtuse. June. *l.* four (or sometimes five) in a whorl, pinnatifid, with obtuse segments, the uppermost ones often quite entire. *h.* 1ft. Dahuria, 1827.

P. sylvatica (sylvan). Red Rattle. *fl.* rose-colour, loosely spicate; corolla 1in. long, with a slender tube. April to July. *l.* much as in *P. palustris*, but having the segments acute. Stems many, 3in. to 10in. long, decumbent, and ascending from a very short root-stock, leafy. Europe (Britain). (F. D. 225; Sy. En. B. 997.)

P. versicolor (various-coloured). *fl.* parti-coloured, red and yellow, or pure yellow, disposed in an oblong spike; galea straight, obtuse, angular in front, with the apex reflexed. June to August. *l.* pinnate; segments or leaflets imbricated backwards, serrated. Root fasciculately tuberous. *h.* 6in. to 12in. Siberia, 1819.

P. verticillata (whorled).* *fl.* rose-colour or white, pedicellate; galea of corolla straight, toothless and beardless; spikes dense, or interrupted at the base. May and June. *l.* pinnate or pinnatifid, with oblong or ovate, obtuse, toothed segments. Stem erect, nearly simple. *h.* 6in. to 12in. Europe, 1790.

PEDILANTHUS (from *pedilon*, a shoe, and *anthos*, a flower; alluding to the shape of the blossoms). Slipper Spurs. SYN. *Crepidaria*. ORD. *Euphorbiaceæ*. A genus comprising about fifteen species of stove shrubs, often with fleshy branches, natives of tropical America, from Brazil to Mexico and the West Indies. Involucres green or coloured, irregular, oblique, disposed in terminal or axillary, dichotomous cymes; male flowers several, females one, to an involucre. Cauline leaves alternate, entire; floral ones frequently opposite. *P. tithymaloides*, which is probably the only species introduced, is a shrub of a succulent nature. It thrives in a thoroughly well-drained, sandy loam, with the addition of a little well-rotted cow-dung. Propagation may be effected by cuttings, thoroughly dried at the base, inserted in sand, and occasionally very slightly moistened.

P. tithymaloides (Tithymalus-like). Jew-bush. *fl.* disposed in rather dense, terminal cymes; involucre purple, nearly ½in. long. Summer. *l.* 1in. to 3in. long, sub-sessile, cuneate at base, ovate or oblong, acute, often recurved at apex, the margins slightly undulated; cauline ones ovate, long-acuminate. *h.* 4ft. to 6ft. West Indies, 1874. (B. R. 837; B. M. 2514, under name of *Euphorbia carinata*; L. B. C. 727, under name of *E. canaliculata*.)

PEDILEA. A synonym of **Microstylis** (which *see*).

PEDILONIA. A synonym of **Wachendorfia** (which *see*).

PEDILONUM. A synonym of *Dendrobium*.

PEDROSIA. Included under **Lotus** (which *see*).

PEDUNCLE. A flower-stalk, whether supporting a cluster of flowers or only a single one.

PEEPUL-TREE. *See* **Ficus religiosa.**

PEGANUM (the old Greek name, used by Theophrastus, for Rue, which the plants resemble). ORD. *Rutaceæ*. A small genus (four species) of hardy, perennial, branched herbs. One is broadly dispersed over the Mediterranean region and the warmer parts of Asia, and the rest are found in Central and Eastern Asia and Mexico. Flowers white, rather large; sepals four or five, narrow, often leafy and pinnatifid; petals four or five, spreading, entire; peduncles one-flowered, opposite the leaves, sub-terminal. Leaves alternate, entire or irregularly multifid, not dotted. *P. Harmala* may occasionally be met with in English gardens. It thrives in any light soil, and may be multiplied by divisions of the root.

P. Harmala (from the Arabic name). *fl.* green-veined, with entire calyces. July and August. *l.* multifid into linear lobes. Root woody. *h.* 1ft. Europe, 1570. (S. F. G. 456.)

PEG-WOOD. A name applied to *Cornus sanguinea* and *Euonymus europæus*.

PEIRESCIA. A synonym of **Pereskia** (which *see*).

PELARGONIUM (from *pelargos*, a stork; in allusion to the beak of the fruit, which resembles a stork's bill—at least, as much as the Geranium does that of a crane). Stork's Bill. Including *Campylia*, *Giconium*, *Grenvillea*, *Hoarea*, *Jenkinsonia*, *Otidia*, *Phymatanthus*, and *Seymouria*. ORD. *Geraniaceæ*. An extensive genus (about 170 species have been described) of, for the most part, greenhouse, glabrous or pubescent, perennial herbs, shrubs, or sub-shrubs, of variable habit, natives, for the most part, of the Cape of Good Hope. Flowers irregular; sepals five, imbricate, connate at base, the upper segment having a spur which is adnate to the pedicel; corolla of five petals (sometimes four or two); peduncles axillary, opposite the leaves, umbellately two to many-flowered, or rarely one-flowered. Leaves opposite or rarely alternate, entire, dentate, lobed, or variously divided, stipular. But few of the species are now in general cultivation, having been, to a great extent, superseded by the numerous handsome hybrid forms. Except where otherwise stated, the species described are South African, and require greenhouse treatment.

It would be difficult to name a more popular plant for gardens of every description than the Pelargonium. The several sections into which the varieties are divided owe their origin principally to hybridising and cross-breeding some of the species indigenous to the Cape; and few, if any, subjects that have ever been taken in hand have so richly and liberally rewarded the hybridist's labour. Throughout the whole year, the Zonal section plays a most important part in furnishing cut flowers, and also decorative plants, for greenhouse, room, and window embellishment; in summer, this section is invaluable for bedding, and is largely represented in the flower garden, though not to the extent, in many places, that it was a few years since. Show, Decorative, and Fancy Pelargoniums are exceedingly floriferous and showy, their flowering season being spring and early summer. The Ivy-leaved sorts form an important and very useful section; many are of trailing habit, and may be used for vases, &c., with good effect. A collection of Cape species and hybrids is far too rarely seen, as the flowers of many, although small, are beautifully and delicately marked, and the habit of the plants is generally very compact. Wherever Pelargoniums for greenhouse decoration are grown, a selection from the species and hybrids should be included. Their leaves are frequently sweet-scented, and useful for mixing with flowers of many other genera; and the plants, when blossoming, afford much more than ordinary interest.

PROPAGATION. Pelargoniums of every description are readily raised from seeds, and the natural habit of the species and single-flowered varieties is generally that of bearing seeds somewhat freely. The seed vessels should be collected just before they burst, and put into a paper bag to ripen. Some cultivators sow at once, but the

Pelargonium—*continued.*

better plan is to preserve until spring, and sow thinly in pans of light, sifted soil, covering to a depth of ¼in. If placed in a gentle heat, the seeds will soon germinate, and the young plants may be grown on under similar treatment to those previously established. They should be placed in pots not larger than 5in. until after they have flowered; any worthless ones should not be retained beyond this stage. In selecting plants from any section with a view to procuring seeds for raising new varieties, it is most important that only those which are very choice should be retained, the standard of excellence being already so high. There is, however, apparently still much room for improvement in one or another essential; and, with such a popular flower, that has already been so vastly improved by hybridising, selection, and seed raising, the work will probably continue to be pursued, and unlooked-for results may, and doubtless will, yet be obtained. The most general method of Pelargonium propagation adopted is that of cuttings, made either from the shoots, or from the roots. Cuttings from tolerably firm shoots will root easily, at almost any time of year, provided they are in a proper state, and placed under suitable conditions. Spring, and the latter part of summer, are the best seasons; and these are most convenient for raising or renewing a stock of plants. The species and hybrids are readily increased by cuttings, made from some of the strongest roots. They should be cut into lengths of 1in. or 2in., inserted in sand, so that the tops show just above the surface, and placed in a temperature of about 60deg. But little water must be given until some leaves are formed, when the young plants may be potted off singly, and grown on in a cooler temperature.

CULTIVATION. It will be most convenient, in referring to cultural details, to deal with the several sections separately, as, although all will succeed under treatment differing but little in many respects, the purposes for which the plants are required, and their seasons of flowering, vary considerably. The principal sections of Pelargoniums, apart from species and their hybrids, are the Show, Decorative, Fancy, Zonal or Bedding, Variegated-leaved, and Ivy-leaved.

Species and Hybrids. Many of these may be propagated by all of the methods to which reference has been made. They are mostly slender-growing plants, and do not require very much root-space, 5in. or 6in. pots being sufficiently large for growing good-sized specimens. Any that are found to be of an evergreen nature should not be kept quite dry in winter, but should be treated as recommended below for the large-flowered Show section; the tuberous-rooted species, and those with succulent stems, require no water all the winter. In early spring, all should be introduced to a little warmth, and gradually watered, when growth will commence for the season, and a house or pit, where plenty of air is admitted, will be the most suitable position. Turfy loam, with a little leaf mould or decayed manure, and some charcoal or sand added, will be the best compost; the pots should be well drained, and the soil rendered tolerably firm. Full exposure to sun and air after flowering will be an essential, in order to thoroughly ripen the wood for the following year.

Show and Decorative Pelargoniums. Large-flowered Show Pelargoniums represent a very extensive and important class of plants, useful for greenhouse decoration, and specially adapted for exhibition as specimens. Decorative sorts are, as their name indicates, more especially suited for ornamentation; their flowers are not so evenly formed, but they are produced in the greatest profusion; the habit is also extremely sturdy and compact. Cuttings should be procured, early in August, from the ripened shoots of plants that have been exposed to the sun until the current year's wood has become hardened.

Pelargonium—*continued.*

Every two firm joints, or even one, will, if required, form a short cutting, which, under proper treatment, will be almost certain to grow. Insert them, about 2in. apart, in pots or pans of sandy soil, and place in an ordinary frame, fully exposed to sun. When rooted, pot off singly, in about 3in. pots, and press or ram the soil quite firm; give only a little water, and return the plants to a close frame or house until re-established. If the points are soon afterwards pinched out, three or four new shoots will form, and these should be tied down, when large enough to handle, close on the rim of the pot. Keep near the glass, in a cool house, and apply sufficient fire-heat to maintain a night temperature of about 45deg.; anything above freezing point will, however, suffice in very severe weather. About December, the final potting may be given, and if the plants are wanted in flower early, they should receive no further stopping; if late, pinch the points out again about the middle of January. Grow on near the glass, in a light, airy structure, and, when the flower-trusses appear, give some weak liquid manure. Show Pelargoniums require good drainage, and should be kept rather dry than otherwise, particularly in autumn and winter, when progress in growth is but slow. Good fibrous loam, torn up by hand, with about one-fourth decayed manure or dried cow-dung added, and sufficient sand to keep the whole open, will form an excellent compost. It is important that the soil should be rendered firm in potting; otherwise, the shoots are inclined to become sappy, and lengthen more than is desirable. A good plan is that of preparing the compost some time beforehand, and thoroughly mixing it occasionally.

When the plants are flowering, they should be shaded from sunshine, and be placed where plenty of air can be admitted; they are at all times most impatient of a close atmosphere. Decorative varieties are now very popular, and are extensively grown, because of their early flowering and compact habit. Young plants of these should not be stopped more than once; they should receive their final potting earlier, and be kept rather warmer in winter, than others which are intended for flowering later in spring. When the season of each is over, and the plants are removed from under glass, they should be placed out of doors, in full sunshine, for about a month, when they may be cut back, and again started into growth.

Large specimen Pelargoniums are obtained by growing plants for several years. They may receive the treatment already described for the first season. After being cut back, about August, they should be kept syringed, and moderately moist at the root, until beginning to break, when they should be shaken out, the roots partially pruned, and replaced, with new soil, in pots a size smaller than before. Grow on in a similar way to young plants, and transfer, about the end of the year, to the flowering pots, which, for very large plants, need not exceed 8in. or 9in. in diameter. Timely attention must be given to training and tying the growths, in order to equalise and balance the head. When grown in 5in. or 6in. pots, for ordinary decoration, a piece of matting may be tied round, beneath the rim; to this, other pieces may be temporarily attached for tying out the shoots. As the wood solidifies, it will usually remain in the position in which it has been placed, and the ties may be removed. Thus, established plants may be grown several years in pots of a similar size, the soil being annually renewed, and due attention given to feeding with manure water, or artificial manure, at the time the flowers are being formed, and when they are expanding.

Fancy Pelargoniums. These form a class of plants with an exceedingly compact habit; their flowers, though small, are prettily marked, and borne in the greatest profusion. They are tenderer than the large-flowered

Pelargonium—*continued.*

Show varieties, and are not quite so easily grown. Instead of propagating from ripened wood in autumn, early spring is found the best time, and new shoots are taken for the purpose of forming cuttings when they become tolerably firm. The general treatment regarding soil, potting, ripening in summer, &c., given above for the Show section, will also suit this, with the following exceptions: Watering must be even more carefully attended to in winter; a little higher temperature is also desirable, and over-potting must specially be avoided. It is better to err in keeping the roots somewhat dry rather than too wet. Plenty of room must be allowed each plant, or it will soon become drawn; light and air, whenever the latter can be admitted, are also essentials to success. Fancy Pelargoniums are much less vigorous than the Show varieties, and do not require so much tying out; yet sufficient should be done to them in this respect to prevent the numerous shoots overcrowding each other in the centre. The plants may be similarly grown on for several years in succession; but it is advisable to propagate new ones, to gradually replace the old ones.

Zonal or Bedding Pelargoniums. Amongst popular garden plants, few are more widely cultivated than the varieties of Zonal Pelargoniums. They are supposed to have originally descended from *P. inquinans* and *P. zonale*, which were introduced early in the eighteenth century. Varieties of the present day show a remarkable contrast in comparison with them, and the vast improvement in the flower and habit of the plant which has been made, more particularly of late years. Zonal Pelargoniums may be had in flower the whole year round, by affording some little attention to the propagation and preparation of plants. Many of the varieties raised somewhat recently are exceedingly showy decorative subjects when grown in pots under glass, and they are more especially useful throughout the winter for the purpose of cutting. With this latter object in view, cuttings should be inserted in the previous autumn, or early in spring, and the plants obtained should be grown on throughout the summer, and not allowed to flower until, say, about September, when the season for those outside will begin to decline. A light, airy house or pit, with a warm, fairly dry atmosphere, will be the best situation from the time the plants are rooted until about midsummer, when they should be placed on a bed of coal ashes in the open air, or in a shallow pit with the sashes removed. This plan is adopted in order that the growths may be short-jointed and become well ripened by autumn. During winter, a light span-roofed house is best adapted for Zonal Pelargoniums in flower; it should be kept at from about 50deg. to 55deg. by day, and the atmosphere always on the dry side. An excellent and a most successful system of heating houses for the winter treatment of Zonal Pelargoniums in flower, is that of conducting the hot water through a small pipe fixed along the rafters, just above the flower trusses. This plan is not always practicable, or, perhaps, worth the trouble of adopting where only a comparatively few plants are grown; but the success attending it is suggestive as to what are the most suitable provisions to be aimed at under ordinary circumstances. Damp is the greatest enemy to be contended with in winter. In summer, either young or old plants may readily be had in flower at almost any time by leaving their trusses to expand. Young plants should be stopped once or twice, to encourage a compact habit, care being taken always to pinch to a joint at which is situated a growing bud. A system frequently—indeed, generally—practised is that of stopping indiscriminately at whatever joint seems best situated; this should not be adhered to with the Pelargonium unless where there is a growth or wood-bud present, and not a flower-truss. Cuttings that are

Pelargonium—*continued.*

not too sappy will root with the greatest ease in a warm house or pit during spring, and at almost any season, if young plants are required. The plants succeed best in a rich, loamy soil, with some manure; and they flower most profusely if allowed to become somewhat pot-bound, and fed with liquid manure.

Unfortunately, none of the single Pelargoniums are lasting in a cut state, as their petals drop readily. To prevent this with plants for exhibition, and with flower-trusses for market, it is customary to drop the smallest quantity of liquid gum into the centre of each flower, to render it more durable. Varieties with double or semi-double flowers have now become numerous, and are exceedingly useful in a cut state, as, unlike the single ones, they hold on persistently until becoming withered. The plants succeed under treatment similar to those which have single flowers, and are very compact and floriferous, especially the semi-double varieties, that are of a comparatively recent date, and mostly of Continental origin. It must be admitted they are not so showy as varieties with single flowers, but, notwithtanding this, they form a very attractive and useful addition.

Zonal Pelargoniums, used only for bedding, in summer, may be propagated in any quantity towards the end of August, by cuttings obtained from plants outside. These may be inserted rather close together, in either pots or boxes, as may be convenient, and placed on a bed of ashes, in the full sun. Here they may remain until housed up for the winter, about the end of September, in any structure kept a little warm and rather dry. Any dead leaves should be frequently looked for and removed, and but little water should be given. Pot off singly about February, and grow on, in preparation for transplanting outside, in May, or early in June.

Variegated-leaved Pelargoniums. A few varieties of these are invaluable as bedding plants, on account of their coloured foliage and distinct appearance in comparison with the ordinary Zonals. They are severally distinguished as Golden Tricolor, Silver Tricolor, Gold and Bronze or Bicolor, Silver-variegated, Golden-leaved, and Variegated Ivy-leaved. Tricolors, with few exceptions, are rather tender, and do not succeed properly in the open ground, unless under favourable conditions, and in a warm situation. They may be grown well in small pots, under glass. Cuttings from outside should be inserted in pots, early in August, and a warm, rather dry, place selected for them in winter. They may also be readily propagated in heat during spring. The Bronze, Silver-variegated, and Golden-leaved varieties are almost exclusively used for bedding, and may be treated in the same manner as recommended for bedding Zonals. In summer propagating, however, they should be attended to first of the two; and a little heat will be necessary all winter, to preserve the leaves from damping. Variegated Ivy-leaved Pelargoniums are only few in number; being of trailing habit, they are very useful for vases, hanging baskets, &c.

Ivy-leaved Pelargoniums. These have now become a very important class, by the addition of numerous varieties with semi-double flowers. They are more especially adapted for pot culture and greenhouse embellishment than for other purposes, and are most valuable in summer and autumn, when it is desirable that plants under glass should be different from those so plentiful outside, or superior, in point of perfection, if they are varieties of the same thing. Several of the single-flowered trailing sorts are well adapted for hanging over vases, &c., in summer; and such may also be grown in pots, and trained on pyramidal or balloon-shaped trellises. Ivy-leaved Pelargoniums are readily increased from cuttings, which may be inserted at any time when the plants are growing. They should be grown on throughout the summer, and be allowed to rest in a cool place all

Pelargonium—*continued.*

winter. Attend to repotting and tying those large enough for flowering early in spring, and provide them with a light house or pit, with a temperature of about 55deg. Here they will soon grow rapidly, and timely attention must be given to tying the new growths to cover their trellis. Some of the sorts are not trailers; the habit will, of course, distinguish between them at once. Ivy-leaved Pelargoniums are much benefited by frequent syringings up to the time they come into flower; they also require plenty of water at the root.

INSECTS. Pelargoniums are not much injured by insects, with the exception of Aphides, particularly Green Fly. These invariably affect all the sections more or less, though not the Zonals, and those allied to them, so much as the others. Fumigating is the best remedy; it should be practised rather frequently in spring, for prevention as well as cure. It is specially important that the plants should be free from insects at the time they come into blossom, as many of the flowers would be destroyed by measures being afterwards taken to effect an eradication.

P. abrotanifolium (Southernwood-leaved).* *fl.* white or rosy, the two broader upper petals having a red spot; calyx tube much longer than the pedicels. May. *l.* powdery, fan-shaped, three-parted; lateral segments deeply two or three-lobed; terminal one multifid, with linear, channelled, blunt lobes. *h.* 3ft. 1791. A slender, canescent shrub. (Sw. Ger. 351.)

P. angulosum (angular). *fl.* purple, with dark streaks, panicled; pedicels and calyces densely hairy and rough; petals twice as long as the acuminate sepals. Summer. *l.* shortly stalked, truncate or broadly-cuneate at base, with three to five shallow, angular, acute, toothed lobes. 1724. A large bush. From this species, *P. cucullatum*, and *P. grandiflorum*, have originated those races of garden plants known as Show, Decorative, and Fancy Pelargoniums.

P. apiifolium (Parsley-leaved). *fl.* sub-sessile; calyx tube three or four times longer than the reflexed segments; petals dark, with a pale border, obovate, reflexed. June. *l.* pinnati-partite, pinnæ petiolate, pinnatifid-pinnate; segments cuneate, flat, laciniate, glabrous and glaucous. Stem thick and fleshy; flowering branches slender, herbaceous. 1800.

P. ardens (glowing).* *fl.* bright scarlet, shaded with a darker colour; umbels many-flowered. Summer. *l.* hairy, cordate at base, oblong, unequally lobed, sometimes ternate. Stem thick, suffruticose. *h.* 1ft. to 1½ft. This very fine garden plant is a hybrid between *P. fulgidum* and *P. lobatum*. (L. B. C. 139; Sw. Ger. 4.)

P. betulinum (Birch-like).* *fl.* purple, with dark streaks; pedicels and calyx silky; petals twice as long as the sepals; peduncles deflexed, three or four-flowered. July. *l.* seldom 1in. long, shortly petiolate, oval or ovate, obtuse, unequally toothed, sub-glabrous or scaberulous. *h.* 3ft. 1759. A rather slender, erect shrub. (B. M. 148.)

P. bicolor (two-coloured).* *fl.* nearly sessile; calyx segments reflexed; petals purple, with a pale border, obovate. July. *l.* on long petioles, cordate at base, pinnatifidly lobed, 3in. to 4in. long, and nearly as broad, softly pubescent, margins dentate; lateral segments broadly cuneate, bilobed and cut, the terminal one trifid and toothed. Stems shrubby, succulent, sparingly branched. *h.* 1ft. to 2ft. 1778. (B. M. 201; Sw. Ger. 97.)

P. Bowkeri (Bowker's).* *fl.*, calyx tube 1½in. long; petals bipartite, eight to ten lines long, purple at base, with yellow, capillary, fringe-like lobules; umbel many-flowered; scape 12in. to 14in. high. Summer. *l.*, radical ones on petioles 5in. to 6in. long, decompound, linear-lanceolate, 5in. to 6in. long, each segment as finely divided as a Fennel-leaf. Stem short and succulent. 1864. Herb. (B. M. 5421.)

P. capitatum (capitate). *fl.* rosy-purple, in dense, many-flowered heads. Summer. *l.* long-stalked, cordate, three to five-lobed; lobes obtuse and rounded, toothed. 1790. A shrub with branches, in a wild state, generally trailing on the ground. This species is largely cultivated in the Mediterranean region for an essential oil distilled from the leaves, which is used as a perfume, and also for adulterating otto of roses. Probably, *P. capitatum* is one of the parents of the garden hybrid ROLLISSON'S UNIQUE, a handsome, free-flowering plant, with purplish-crimson flowers.

P. carnosum (fleshy). *fl.* generally white, small, on long, branched peduncles; pedicels patently setose; umbel many-flowered, with short bracts. May. *l.* 2in. to 4in. long, shortly petiolate, oblong, deeply pinnatifid, somewhat fleshy, cut nearly to the midrib; segments flat, sharply cut or pinnatifid. Stem 1ft. to 2ft. high, succulent, clumsy, not much branched. 1724. (Sw. Ger. 98.)

P. comptum (decked).* *fl.* many in an umbel; calyx villous; petals nearly obcordate, the upper ones larger, bright pink, lighter at the base, and with a dark purple spot in the centre, and numerous stripes below it, the lower ones darker. Summer and autumn.

Pelargonium—*continued.*

l. kidney-shaped, rounded, slightly lobed, unequally and rather deeply notched; petioles slender. Stem erect, branched, shrubby, succulent. Hybrid. (Sw. Ger. 255.)

P. cordatum (cordate-leaved). *fl.* purple, white; calyx and pedicels generally densely villous; petals twice as long as the sepals; peduncles branched or panicled, the partial ones short and many-flowered. May. *l.* long-petiolate, cordate, acute, denticulate, and sometimes repand-lobulate; stipules subulate from a broad base. *h.* 3ft. 1774. An erect, much-branched, villous or sub-glabrous shrub. (B. M. 165 under name of *P. cordifolium*.)

FIG. 63. PELARGONIUM ENDLICHERIANUM.

P. crispum (curled-leaved).* *fl.* purple; sepals oblong, acuminate; petals narrow; peduncles short, two or three-flowered. September. *l.* ½in. to 1½in. long, distichous, shortly petiolate, fan-shaped, truncate or cuneate at base, trilobulate or deeply three-lobed, coarsely toothed, rigid and rough, curled, strongly scented. *h.* 3ft. 1774. A slender, much-branched shrub. (Sw. Ger. 383.)

P. cucullatum (hooded-leaved). *fl.* purple; petals twice as long as the lanceolate-acuminate sepals; pedicels and calyx silky. Summer. *l.* long-stalked, reniform-cupped, denticulate, very soft. 1690. This species is the parent of a large number of garden hybrids: some of the double forms are very pretty.

P. denticulatum (toothed). *fl.* lilac or rosy-purple; upper petals emarginate or bifid. Summer. *l.* long-stalked palmati-partite, glabrous and viscid above, hispid beneath; lobes simple or pinnatifid, linear, flat, coarsely toothed. 1789. A slender, half-herbaceous species. (Sw. Ger. 109.)

P. echinatum (bristly).* *fl.* mostly white, with a dark red spot on the upper petals, but sometimes deep purple; petals emarginate; pedicels very short; partial peduncles six to eight-flowered. June. *l.* long-petiolate, cordate-ovate, obtuse, somewhat three, five, or seven-lobed; lobes rounded, crenulate or bicrenulate, pubescent above, white-tomentose beneath. Stem fleshy, armed with persistent, spine-like stipules. *h.* 1ft. 1789. Shrub. (B. M. 309; Sw. Ger. 54.)

Pelargonium—*continued.*

P. Endlicherianum (Endlicher's).* *fl.* deep rose-coloured, large; sepals spreading; two larger petals marked with five deep purple nerves; peduncles long, terminal; umbel terminal, many-flowered. July. *l.* few; radical ones long-petiolate; cauline ones on shorter stalks; all cordate, plicate, with a deep sinus, obscurely five-lobed. Stems simple, erect, herbaceous. Rootstock large. *h.* 2ft. Taurus, 1855. Nearly hardy. See Fig. 63. (B. M. 4946; F. d. S. 2031; R. G. 311.)

FIG. 64. FLOWERING BRANCH OF PELARGONIUM INQUINANS.

P. fissum (cleft).* *fl.* pale pink, not dotted or streaked; petals sub-equal, exceeding the calyx. Summer. *l.* roundish-reniform, with toothed lobes, hairy when young. *h.* 1ft. Herbaceous. (Ref. B. 149.)

P. fragrans (fragrant), of Sweet.* Nutmeg-scented Geranium. *fl.* white, marked with red lines on the upper petals; upper calyx segment erect, the others reflexed; two upper petals ligulate, slightly emarginate, the lower ones obovate or broadly spathulate. Summer. *l.* roundly cordate, generally three-lobed, bluntly toothed or crenate, strongly veined beneath, densely pubescent. Stem shrubby, erect, much-branched; branches spreading. *h.* 2ft. Hybrid. (Sw. Ger. 172.)

P. gibbosum (swollen). Gouty Geranium. *fl.* greenish-yellow, on very short pedicels; calyx segments villous, pubescent; petals obovate. June. *l.* glaucous and nearly glabrous, pinnatipartite; segments one or two pairs, with a terminal one, the lowest petiolate, all broadly cuneate, cut or lobed; stipules small. Stem shrubby, succulent, much swollen at the distant nodes. *h.* 1½ft. 1712. (Sw. Ger. 61.)

P. glaucifolium (Horned Poppy-leaved).* *fl.* very dark, velvety, blackish-purple, edged with greenish-yellow, exquisitely fragrant; calyx segments obtuse; petals all obovate, the two upper ones rather larger. Summer. *l.* variable in form, ternate, pinnatifid, lobed, or sinuated, densely woolly beneath. Stem suffruticose, slightly branched. Root tuberous. Hybrid between *P. gibbosum* and *P. lobatum*. (Sw. Ger. 179.)

P. grandiflorum (large-flowered). *fl.* large; petals nearly three times longer than the calyx, two upper obovate, white, marked with red branching lines at the base, lower ones broadly spathulate, white. *l.* long-stalked, palmately five to seven-nerved, deeply five to seven-lobed. 1794. Supposed to be one of the parents from which have originated the Show and Fancy Pelargoniums of florists. (A. B. R. 12; Sw. Ger. 29.)

P. heracleifolium (Heracleum-leaved). *fl.* greenish-yellow; calyx segments pubescent, half as long as the obovate petals;

Pelargonium—*continued.*

umbel ten to twelve-flowered. July. *l.* rather thick, softly villous above, tomentose beneath, oblong, deeply incised-pinnatifid or somewhat pinnate, serrated, the terminal segment very large. Stem short and deflexed, herbaceous. *h.* 6in. 1800. (L. B. C. 437; Sw. Ger. 211.)

P. hirsutum melananthum (hairy, black-flowered). *fl.* blackish-purple; calyx softly pubescent, the sepals with membranous margins; umbels many-flowered. Summer. *l.* stalked, very variable, simple, pinnatifid, bipinnatifid, or almost pinnatipartite. *h.* 6in. to 12in. Herbaceous. (Sw. Ger. 73.) SYNS. *Hoarea atra* (Sw. Ger. 72), *H. melanantha*.

P. hybridum (hybrid). *fl.* pale scarlet; calyx segments spreading; petals five, or sometimes six, wedge-shaped, the two uppermost ones smallest, and converging at base. September. *l.* roundish-reniform, truncate at base, slightly lobed, unequally notched; petioles hairy. Stem shrubby, much-branched; branches short. *h.* 2ft. 1732. (Sw. Ger. 63.)

P. ignescens (fiery-flowered).* *fl.* scarlet; nectariferous tube twice as long as the calyx; two upper petals obovate, the three lower ones ligulate. Summer. *l.* cordate, deeply three-lobed, in some cases nearly to the base; the side lobes slightly bilobed, the intermediate one trilobed. Stem shrubby, with a few succulent branches. *h.* 1½ft. 1812. Hybrid. (L. B. C. 109; Sw. Ger. 2.)

P. inquinans (stained-flowered).* *fl.* varying from intense scarlet to rose-colour and white; petals broadly obovate; pedicels very short; peduncles long, many-flowered. July. *l.* shortly petiolate, orbicular-reniform, velvety, and somewhat viscous-pubescent, crenate, almost undivided or obsoletely multi-lobulate. Younger branches succulent, velvety. *h.* 2ft. 1714. This shrub is the parent of most of the so-called "Scarlet Geraniums" of our gardens. It lacks the horseshoe mark of *P. zonale*, and has broader and shorter petals. See Fig. 64.

P. millefoliatum (Milfoil-leaved). A synonym of *P. triste*.

P. oblongatum (oblong).* *fl.* cream-coloured, marked on the upper petals with purple veins; calyx tube and stamens very long; petals broadly obovate; umbels many-flowered. Summer. *l.* glabrous, fleshy, on long or short petioles, broadly ovate, obtuse or sub-acute, pale green, paler below; margins lobulate and obscurely irregularly toothed, sometimes multifid. Root tuberous. *h.* 6in. 1872. (B. M. 5896.

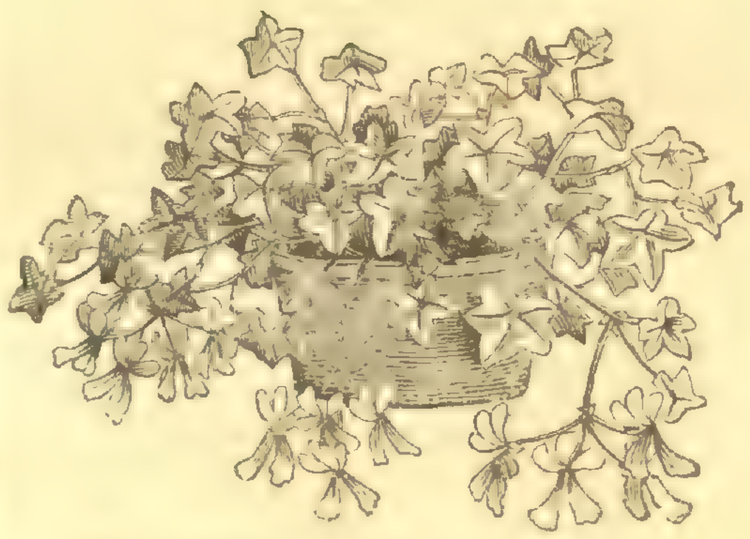


FIG. 65. PELARGONIUM PELTATUM, showing Habit and portion of detached Umbel.

P. peltatum (peltate-leaved).* Ivy-leaved Pelargonium. *fl.* varying from white to red, large or small; petals twice as long as the calyx; peduncles elongated, four to eight-flowered. July. *l.* glabrous or pubescent, fleshy, peltate, radiately five-nerved below, bluntly five-angled or lobed, with very entire margins. Stem shrubby; branches angular, weak and straggling. *h.* 2ft. 1701. See Fig. 65. (B. M. 20; Sw. Ger. 95.)

P. pulchellum (pretty).* *fl.* umbellate, outer ones pedicellate, inner ones sub-sessile; petals white, each with a large, deep red spot; scapes branched, pilose. April. *l.* on short, hairy petioles, oblong, silky, incised-pinnatifid; lobes oblong, acute; stipules broadly ear-shaped, rigid. Stem short and succulent, scarcely branched, sometimes obsolete. 1795. (B. M. 524; Sw. Ger. 31.)

P. quercifolium (Oak-leaved).* Oak-leaf Geranium. *fl.* purple or pink, shortly pedicellate; sepals elliptic, mucronate, half as

Pelargonium—*continued.*

long as the petals; peduncles deflexed, three to five-flowered. May. *l.* shortly petiolate, cordate at base, sinuato-pinnatifid, hairy, strongly scented; lobes and sinuses rounded; margins wavy and crenated. Stem much-branched. *h.* 3ft. 1774. A well-known shrub.

P. Radula (Radula).* *fl.* pale purple, with dark streaks, small, pedicellate; calyx densely setose and glandular, the tube short; peduncles short, hispid, four or five-flowered. June. *l.* on rather long petioles, palmati-partite, roughly hispid above, softly pubescent beneath; lobes narrow-linear, pinnatifid, with revolute margins. *h.* 3ft. 1774. A much-branched, balsamic-scented shrub. X Rose Geranium

P. sanguineum (bloody). *fl.* scarlet, pedicellate; calyx tube long or short, with reflexed segments; petals narrow-obovate. July. *l.* pinnati-partite, glabrous, rather thick; pinnæ sessile, decurrent, laciniately pinnatifid, with obtuse lobes. Stem shrubby, fleshy, nodose, glabrous; flowering branches herbaceous. *h.* 1ft. Probably a hybrid. (Sw. Ger. 76.)

P. schizopetalum (cut-petaled). *fl.*, petals five, nearly equal, two-parted, the divisions multifidly laciniate, or divided into numerous branching segments, the two upper ones pale yellow, the lower ones brownish-purple; umbel several-flowered, spreading. Summer. *l.* about 6in. long, ternate or deeply trifid, obtuse, oblong-oval, undulate, hairy on both sides, unequally round-toothed; terminal leaflet very large, eleven to thirteen-lobed. Stem short, suffruticose, rather succulent. Root tuberous. *h.* 1ft. 1821. (Sw. Ger. 232.)

P. Schottii (Schott's).* *fl.* 1¼in. to 1½in. in diameter; calyx tube 1in. long; petals crimson, with black, elongated, broken blotches running into the nerves on the disk; umbel six to ten-flowered; peduncle 4in. to 10in. long, simple or branched. *l.* scattered, on petioles 4in. to 10in. long, pinnately three to seven-foliolate; lobes or pinnules all much cut and lobulate, with waved and crisped, toothed margins. Stem succulent, branched, 1ft. to 1½ft. high, somewhat shrubby at base. Plant hairy. Garden hybrid. (B. M. 5777.)

FIG. 66. INFLORESCENCE AND LEAF OF PELARGONIUM TRICOLOR.

P. tricolor (three-coloured).* *fl.* on long pedicels; sepals villous; two upper petals generally very dark red, the three lower ones white, but sometimes the upper ones are coloured at the base only, where there is always a darker spot; partial peduncles two or three-flowered. July. *l.* on long, slender petioles, villous-canescent, lanceolate or oblong, incised-toothed or lobed. Stem shrubby, short, branching, diffuse. *h.* 1½ft. 1791. See Fig. 66. (B. M. 240; Sw. Ger. 43.)

P. triste (dull-flowered). *fl.* dull brownish-yellow, with dark spots, or partly dark-brown, with a pale border, very sweetly aromatic at night; petals twice as long as the calyx segments; peduncles long; umbel many-flowered. July. *l.* 8in. to 12in. long; radical and lower ones bi-tripinnately decompound; segments decurrent, toothed and laciniated, the teeth gland-tipped. Stem short or scarcely any, deflexed, succulent. 1632. Herb. (B. M. 1641.) SYN. *P. millefoliatum* (Sw. Ger. 230).

P. t. filipendulifolium (Dropwort-leaved). *l.* sub-bipinnatifid; segments broader than in the type. Plant caulescent. (Sw. Ger. 85, under name of *P. filipendulifolium.*)

P. vitifolium (Vine-leaved). *fl.* purple, small, sessile, in densely many-flowered heads; petals short. July. *l.* on long petioles, cordate at base, three-lobed; lobes shallow, very obtuse and rounded, toothed; stipules broadly cordate. *h.* 1½ft. 1724. Plant suffruticose, erect, densely hairy and villous.

P. zonale (zonal). "Horseshoe Geranium." *fl.* varying from scarlet and crimson through all shades of red to pure white, subsessile; calyx tube four or five times longer than the segments; petals narrow-cuneate or spathulate; peduncles long, many-

Pelargonium—*continued.*

flowered. August. *l.* on long petioles, roundish-cordate, glabrous or pubescent, mostly with a dark horseshoe mark above (whence the common name), crenate-toothed, obsoletely many-lobed. Younger branches succulent. *h.* 2ft. 1710. A well-known shrub. See Fig. 67. *P. stenopetalum* is a variety with very narrow-

FIG. 67. FLOWERING BRANCH OF PELARGONIUM ZONALE.

linear petals. Of *P. zonale* there are innumerable garden forms, of which a selection is subjoined. Now and then, seedlings develop only proliferous flowers, like those shown in Fig. 68.

FIG. 68. ABNORMAL PROLIFEROUS INFLORESCENCE OF PELARGONIUM ZONALE.

VARIETIES. Pelargoniums are exceedingly numerous in varieties, a circumstance not to be wondered at when it is remembered how readily seedlings may be raised, and how successful have been the results attending the hybridising and improvement of these plants as systematically carried out by English and Continental raisers. Subjoined is a selection of varieties representing the several sections that have been referred to in the foregoing cultural instructions. Doubtless, many others

Pelargonium—*continued.*

which have necessarily to be omitted here are equally meritorious with those included; this is unavoidable where there is such a vast quantity to select from, and where only a limited number can be referred to.

Large-flowered Show Pelargoniums.

ADVENTURER, maroon spot, lower petals rose, white centre; fine form. AMBASSADOR, upper petals deep, lower petals rosy-pink, clear white eye. AMETHYST, rich purple, top petals deep maroon; dwarf and free-flowering habit, fine. BEACON, crimson, very free; excellent habit. CHIEF SECRETARY, rosy-crimson, shaded with maroon and orange, white centre; very free and effective. CLARIBEL, pure white, with small, bright carmine spot on top petals; extra good. CONFESSOR, black top, narrow rose margin, lower petals rose, white centre; large and fine. DEMOCRACY, lower petals purple, suffused with lilac, dark upper petals, white centre. DESDEMONA, white; early, very free-flowering. DESPOT, deep crimson, maroon spot on upper petals. DUKE OF CONNAUGHT, crimson-scarlet, suffused with purple. FLORENCE, rich crimson, light centre; very free. FORTITUDE, orange, with black spot on top petals, rose edge, lower petals pink, clear white centre; large and very fine. ILLUMINATOR, bright vermilion-scarlet, rich and glossy, clear white centre; extra fine. INVINCIBLE, rich crimson-maroon top petals, lighter centre; dwarf habit. JOE, upper petals dark maroon, with narrow purple margin, lower rosy-purple, white centre; dwarf and free habit. LORD CLYDE, scarlet, dark maroon blotch on upper petals. MAGNATE, top petals black, narrow fiery edge, white centre, shaded; large and fine. MAID OF HONOUR, pink, small dark maroon blotch on upper petals, large white centre; of great size. MAN-AT-ARMS, rich dark top petals, lower petals shaded crimson; a large flower of fine form; extra. MANDARIN, dark rich crimson, with broad, bright margin; free and dwarf habit. MARGARET, top petals dark maroon, rosy-purple margin, white centre; fine large flower. MARTIAL, deep rich crimson, maroon top, narrow fiery edge; free, robust habit, extra fine. MARY HOYLE, orange-rose, white centre. MONARCH, petals crimson-purple, black top, with crimson edge, white centre. NEGRESS, very dark maroon, pure white eye. OUTLAW, black top petals, narrow margin of bright crimson, white centre; large and fine. PURPLE GEM, deep purple, top petals black maroon, purple margin. PURPUREA, rich purple-edged lilac, clear white centre; good habit. RETREAT, deep rose, maroon spot, white centre; free. ROYAL REVIEW, lower petals richly painted crimson, very dark top petals, narrow crimson edge; dwarf and very free; extra fine. SAPPHO, cherry-rose, suffused purple, small maroon spot on top petals, white centre; dwarf and very floriferous. SCOTTISH CHIEFTAIN, painted crimson, top petals dark maroon. SEYLA, pale rose, maroon top petals, clear white centre. STATESMAN, pale rose, lower petals maroon, top margined with rose, white centre; large. THE BARON, lower petals rosy-crimson, shot with purple, black top petals, white centre; very distinct. THE CZAR, rich deep crimson, of great substance and good quality; free habit. VETERAN, lower petals rose, upper ones maroon, white centre; fine large flower. VIRGIN QUEEN, pure white, with purplish-carmine spots on the top petals; dwarf, sturdy habit.

Decorative Pelargoniums. Spotted, Fringed, and Semi-double.

ANNIE HEMSLEY, bright rosy-crimson, tinted orange, pure white centre and margin, maroon blotch on upper petals; good habit, extra fine. CAPTAIN RAIKES, bright crimson, dark blotch on upper petals; double. CARL KLEIN, orange-scarlet, black spot on each petal, semi-double, beautifully fimbriated. DECORATOR, crimson, with maroon spots; free and effective. DIGBY GRAND, white, with dark blotch on upper petals, heavily fringed. DRESDEN CHINA, white, striped carmine; a great novelty. DR. MASTERS, dark maroon, crimson edges, much fringed. DUCHESS OF BEDFORD, fringed white, carmine spot; very free. DUCHESS OF EDINBURGH, fringed white purple blotch: dwarf free habit. FAIRY QUEEN, pale pink, small spots, very free and effective. GOLD MINE, orange-scarlet, white centre; free and fine. GRAND LILAS, French white, purple spot: free. INTEGRITY, bright scarlet-crimson, small black spot; dwarf, free habit. KINGSTON BEAUTY, white, dark blotch; very free and good. LADY BLANCHE, white, with small crimson spots. LUCIE LEMOINE, pure self-white; novel. MADAME C. KOLNIG, white; free and fine. MADAME THIBAUT, white, richly blotched and marbled with rose, large white centre; petals fimbriated; extra fine. MAID OF KENT, fringed white, rose-coloured spot; free, dwarf habit. MARIE LEMOINE, white, with small purple spots; large, stout flower; dwarf habit. MERMERUS, bright red, maroon spots. MR. ASHBY, dark rose, maroon spot, light centre; dwarf habit. MR. JOHN HAYES, shaded rosy-pink, white edges; free. MRS. ASHBY, rosy-crimson, maroon spot, white centre. PRINCE OF NOVELTIES, crimson and maroon, white margin; semi-double. QUEEN VICTORIA, bright orange-carmine, white edges; semi-double. ROSETTA, purple, maroon spots; very free and effective. ROSY MORN, pink, with carmine spots on all the petals; free and good. TRIOMPHE DE ST. MANDÉ, deep crimson; immense trusses; extra fine. TRIUMPHANS, rich purplish-crimson; dwarf and free; very distinct. VENUS DE MILO, white, semi-double; useful for bouquets. VOLONTÉ NATIONALE, light, with rosy-carmine spots and stripes, fringed.

Pelargonium—*continued.*

Fancy Pelargoniums.

ACME, purple-maroon, white throat and margin; good form and habit. ATLANTIC, rich crimson, suffused with purple. BRIDESMAID, delicate pale lavender, edged white. CLOTH OF SILVER, white, with delicate rose blotch. COUNTESS OF DUDLEY, rosy crimson, light throat, lower petals rose; fine. DUCHESS OF EDINBURGH, white, carmine spot on each petal. EAST LYNNE, crimson-purple; large, good shape. ELLEN BECK, lilac-carmine, bright edges; dwarf, free habit. FANNY GAIR, rosy-lake, suffused with purple, white centre and edges; fine. FORMOSA, lake, shaded lilac, white centre and edges: fine form. GODFREY TURNER, crimson, lower petals light crimson, lilac margin. JANNETTE, rich purple, clear white centre and edges; smooth and free. LADY CARINGTON, soft pale peach, top petals suffused pale pink. LORD OF THE ISLES, deep rosy-purple, white centre and edges. LUCY, crimson-lake, shaded violet; robust habit. MISS GODARD, rich crimson, white centre and edge; smooth and fine form. MISS-IN-HER-TEENS, cerise upper petals, lower petals mottled crimson. MRS. ALFRED WIGAN, pink, clear white centre and edges. MRS. DORLING, mottled lilac, white throat and edges; fine form. MRS. DOUGLAS, rose, suffused purple, light centre and edges. MRS. FOSTER, rosy-purple, light edges and centre; large. MRS. GAIR, crimson-purple, white centre and edges; dwarf habit. MRS. HART, rosy crimson-purple, white margin, clear white eye; fine. MRS. MILNE HOME, rosy-lilac, white centre, narrow white margin; free. PRINCESS TECK, white, with carmine spots; very smooth and floriferous. ROI DES FANTAISIES, rosy-crimson, white centre. ROSY MORN, rose, clear white throat and edges; excellent. SILVER CLOUD, pale pink, large white centre; fine shape and substance. THOMAS KING, carmine, suffused violet, lilac edges, white centre; fine. THURIO, carmine, shaded purple, white centre and edges, smooth finely-formed flower. VICTOR HUGO, crimson, large light centre; free.

Zonal and Nosegay Pelargoniums.

Single-flowered Varieties adapted for Pot Culture. AJAX, reddish-scarlet, good form and size, fine bold trusses. CELIA, rich crimson, broad overlapping petals; attractive. CHARLES SCHWIND, dark crimson, large truss; vigorous habit. COMMANDER-IN-CHIEF, rich scarlet, free-flowering, compact; a fine variety. CONSTANCE, rich rose; very free. DR. ORTON, rich dark crimson, large trusses; compact habit, extra fine. EDITH GEORGE, reddish-pink, trusses very large and globular. EVENING STAR, white, with large pink eye, very compact. FANNY CATLIN, soft rosy-salmon, large white eye, good flower and truss. FERDINAND DE LESSEPS, fine scarlet; dwarf habit. HENRY JACOBY, rich dark crimson, trusses extra fine; dwarf, compact habit. HERMIA, rosy-red, flowers and trusses large; good. HETTIE, rosy-magenta, fine form and substance, compact. IANTHE, crimson-magenta, compact. IMOGEN, soft salmon, well-formed flowers. JEANNE D'ARC, white, good shape. J. MCINTOSH, crimson-scarlet; free, dwarf habit. JOHN GIBBONS, bright orange-scarlet, pips and trusses very large; extra fine. KATE GREENAWAY, rosy-pink, large round flowers; very free. LADY BAILEY, rosy-pink, large truss; fine. LADY CHESTERFIELD, deep salmon, fine form. LADY REED, pure white, with scarlet centre; one of the finest oculated varieties. LENO, magenta; very dwarf and free. LIZZIE BROOKS, salmon-scarlet, fine shape. LORD ROSEBERY, cerise-red. LUCY BOSWORTH, bright rose-pink, with white on upper petals, fine round pips, large truss. M. CHEVREUL, rich magenta, suffused purple; a fine variety. MISS SKIPWORTH, bright pink, white blotch on upper petals. MRS. HUISH, magenta-scarlet, very floriferous; dwarf habit. MRS. JOHNSON, rosy-magenta, pleasing shade; free. MRS. NORRIS, fiery-scarlet; very dwarf and free. MRS. STRUTT, pink, with purple shade, flowers and trusses large, well formed. MRS. WHITELEY, bright scarlet, white eye, of fine form; dwarf habit. NIPHETOS, white; dwarf, and free flowering. NORAH, soft blush, large. PLUTARCH, bright scarlet, small white eye, of great substance and size. QUEEN OF THE BELGIANS, white; compact, floriferous habit; one of the best white varieties. SCARLET CLOTH, rich scarlet, large flowers and trusses. SOPHIE BIRKIN, mottled salmon, large; one of the best in its class. SWANLEY GEM, rosy-salmon, large white centre, bold truss. TITANIA, rich crimson-maroon, clear white eye.

Single-flowered Varieties specially adapted for Bedding. DR. ORTON, rich dark crimson; very compact and floriferous. HENRY JACOBY, much like DR. ORTON in colour and habit, trusses extra fine; one of the best for bedding or pots, fast becoming a great favourite. JOHN GIBBONS, bright orange-scarlet; very free-flowering; vigorous habit. MRS. HOLDEN, deep rose, petals very narrow, the upper ones blotched with white; dwarf, very free-flowering, and showy. MRS. LEAVERS, deep pink, upper petals blotched white, large truss; dwarf habit. MRS. TURNER, purplish-pink, petals narrow, very large truss; vigorous habit. REV. A. ATKINSON, crimson-scarlet, trusses very large, somewhat loose; free-flowering, vigorous habit. TRIOMPHE DE STELLA, bright orange-scarlet; dwarf, and exceedingly floriferous. VESUVIUS, scarlet, small white eye; an old, well-known variety. WALTHAM SEEDLING, magenta-scarlet; very free-flowering. WEST BRIGHTON GEM, clear scarlet; very dwarf and free-flowering. WHITE CLIPPER, white; very free; one of the best white varieties for bedding.

Double-flowered Varieties suitable for Pot Culture. CANDIDISSIMUM PLENUM, double white, sometimes slightly tinged

Pelargonium—*continued.*

pink; large. CHARLES DARWIN, deep purplish-crimson, semi-double. CHARLES LALANDE, intense crimson, flowers and trusses medium-sized. DR. JACOBY, peach, shaded white. EDOUARD LEQUIN, magenta-red; very showy. F. V. RASPAIL, deep scarlet, fine large pips; compact habit. GUILLON MANGILLI, magenta-scarlet, top petals orange-scarlet, semi-double, trusses very large; a very showy variety, one of the best. HENRY CANNELL (Thorpe), scarlet, semi-double; excellent truss and habit. J. C. RODBARD, orange-scarlet, large. JEWEL, pure scarlet, flowers small, resembling the blossom of a double Hawthorn, trusses small and neat; distinct, and useful for button-

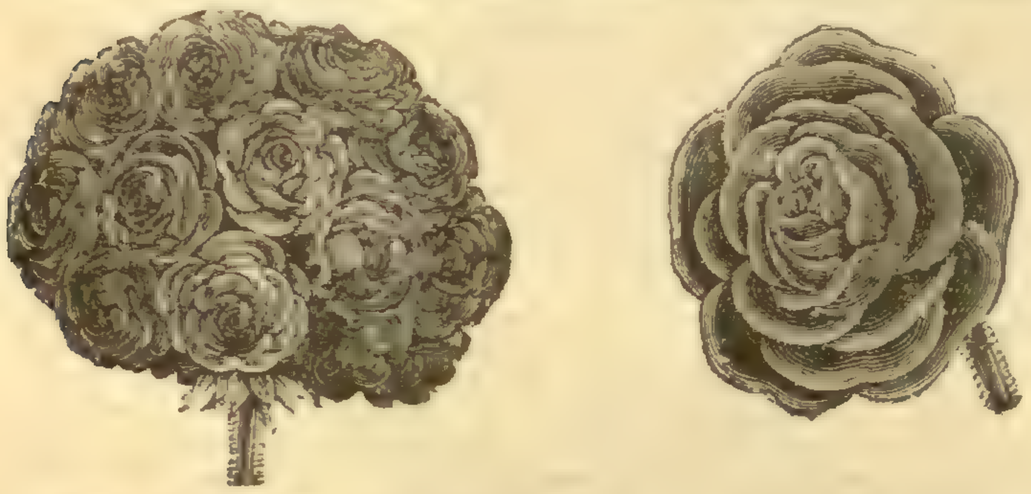


FIG. 69. TRUSS AND SINGLE FLOWER OF DOUBLE ZONAL PELARGONIUM (JEWEL).

holes and bouquets (see Fig. 69). LA CANDEUR, white, double. LE CYGNE, pure white; fine form, and very compact habit, one of the best. LOUIS BUCHNER, pale salmon; good form. MADAME A. BALTET, nearly pure white; free habit. MADAME THIBAUT, magenta-rose, upper petals marked white; very free-flowering, compact habit. MAGENTA KING, magenta, fine large flowers and trusses. MARIE LEMOINE, soft carmine, large flowers and trusses; dwarf and free. M. PASTEUR, deep crimson, large, well formed. ROI DES VIOLETTES, rich violet-purple, large and double. WONDERFUL, orange-scarlet, semi-double; a sport from the single variety VESUVIUS, the habit of which it retains.

Variegated-leaved Pelargoniums.

These need no separate descriptions, as there is so little variation in the different varieties, of which a sufficiently extensive selection is given:

Golden Tricolors. EDWARD RICHARD BENYON, FLORENCE, JOHN DOWNIE, LADY CULLUM, MACBETH, MARIE STUART, MRS. POLLOCK, PETER GRIEVE, SOPHIA DUMARESQUE.

Silver Tricolors. DOLLY VARDEN, EVA FISH, LADY DOROTHY NEVILLE, LASS O'GOWRIE, MINNIE WARREN, MRS. CLUTTON, MRS. LAING, MRS. R. B. POSTANS, PRINCE SILVERWINGS.

Golden Bronze. BLACK DOUGLAS, GOLDEN HARRY HIEOVER, GOLDEN SUPERB NOSEGAY, MARÉCHAL MACMAHON, MODEL, THE SHAH.

Silver Variegated. FLOWER OF SPRING, LITTLE TROT, MANGLES' VARIEGATED, MISS KINGSBURY, PRINCESS ALEXANDRA.

Yellow Leaved. CREED'S SEEDLING, CRYSTAL PALACE GEM, ROBERT FISH.

Ivy-leaved Pelargoniums.

Single-flowered. BEAUTÉ DE LYON, purplish-scarlet, large trusses; bold foliage. BRIDAL WREATH, pure white ground, small pink eye; bushy, half-trailing habit; very pretty. DUKE OF EDINBURGH, pale rose, upper petals veined; large variegated leaves, yellowish-green with white margin; free, trailing habit. GEM, blush-white, crimson spot on upper petals; compact, upright-growing habit. INNOCENCE, large white flowers, shaded lilac; free, trailing habit, free-flowering. LA FRANCE (hybrid), beautiful light rose, trusses and flowers very large; free habit, extra fine. L'ÉLÉGANTE, large white flowers; plant of free, trailing growth, with variegated leaves. MASTERPIECE, rich magenta-crimson, trusses of immense size, with large flowers. MRS. H. CANNELL, deep mauve-purple, large trusses. NEMESIS, scarlet; upright-growing habit, very bright and distinct. ST. GEORGE, light rose; flowers of medium size, with broad petals; of vigorous growth and floriferous habit. WILLSII, bright rose; plant of half-trailing habit, free-flowering and showy; one of the oldest varieties.

Double and Semi-Double Flowered. ABEL CARRIÈRE, soft magenta, maroon in upper petals, flowers of extra size and finest form. A. F. BARRON, lilac-rose, flowers large and very full; short-jointed and free habit. CANDEUR, almost pure white, flowers very double; free habit. COMTE H. DE CHOISEUL, flowers very large, full, of a most pleasing shade of colour. COMTESSE H. DE CHOISEUL, beautiful satiny-rose, light margin; a fine variety. CONGO, lilac, centre rose, light edges, of finest form and substance; effective. EMILE LEMOINE, rich orange-scarlet shade, pips very large, semi-double; extra fine and distinct. GENERAL GORDON, beautiful shade of deep rosy-cerise; distinct. GLOIRE DE NANCY, deep rosy-lake, large trusses, medium-sized flowers; very distinct. GLOIRE D'ORLÉANS, rich crimson-magenta, trusses and flowers medium, produced in the greatest abundance; habit dwarf and

Pelargonium—*continued.*

short-jointed. ISIDORE FÉRAL, light rose, pleasing shade, flowers large, very double; one of the best. JEANNE D'ARC, white, suffused light lavender, flowers very large and double; an acquisition, and one of the finest varieties in size of flower. LA ROSIÈRE, soft satiny-rose, lighter margin, flowers very double; free and distinct. LOUIS THIBAUT, deep red, large flowers; of fine shape and substance. MADAME COCHIN, silvery-lilac, slightly marked with maroon on the upper petals; distinct. MADAME CROUSSE, rose-pink, semi-double trusses and flowers, very large and beautiful; extra fine. MADAME E. GALLÉ, nearly pure white, very double and large; one of the best. MADAME THIBAUT, bright rose, flowers very large and exceedingly double; habit compact and floriferous, extra fine. MADAME THUVENIN, soft rosy-cerise, large, pretty shade of colour. MARGUERITE JACQUOT, rosy-pink, edged silvery-blush, large and double. MASSENET, bright magenta, semi-double, bold truss. M. DE LESSEPS, reddish-pink, large pips; very full, and of fine shape. MRS. MOORE, white, bordered lilac and crimson. VISCOUNTESS CRANBROOK, satin-rose, a beautiful shade of colour, very double; dwarf, and short-jointed.

PELECYPHORA (from *pelekyphoros*, hatchet-bearing; referring to some fancied resemblance in the tubercles to a hatchet). Hatchet Cactus. ORD. *Cacteæ*. A monotypic genus, very nearly allied to *Mammillaria*. The species and its variety require a sandy soil, good drainage, and very careful supplies of water. Propagated most readily by seeds, which germinate freely in moderate heat; offsets are seldom produced. *See also* **Cactus.**

P. aselliformis (woodlouse-like).* *fl.* white, rose, borne near the summit of the stem, 1in. to 1½in. in diameter, consisting of several series of sepals and petals, numerous stamens and stigmas. Stem short, cylindrical, covered with mammillæ or tubercles of a flattened form; at the apex, and in the place of the spines of the Mammillarias, are two rows of flat, horny scales, which overlap, like the tiles of a roof. June. *h.* 4in. Mexico, 1843. Greenhouse. *The specific name refers to the rows of scales, which have been compared to the scaly back of a woodlouse.* (I. H. vi. 186.)

P. a. concolor (one-coloured). *fl.* 1½in. in diameter, clustered towards the top of the stem; perianth tube short, free, naked, *funnel-shaped; segments in about four series, rose-purple,* obovate-oblong, acute; stamens very numerous. Stem tufted, shortly cylindric, 3in. to 4in. high, 1½in. to 2in. in diameter, often constricted about the middle; apex rounded; mammillæ spirally arranged, vertical, ⅛in. long, woolly in the axils; spines minute, pungent. Mexico. (B. M. 6061.)

PELEXIA (from *pelex*, a helmet; referring to the shape of the back sepals). ORD. *Orchideæ*. A genus consisting of seven or eight species of stove, terrestrial orchids, natives of tropical America, from Brazil to the West Indies and Central America. Flowers mediocre, arranged in a sometimes dense, sometimes elongated and loose, sub-sessile spike; back sepals erect, connate with the petals in a narrow galea; lateral ones linear; lip affixed to the base of the peltate column, erect, linear, canaliculate, the base produced into a spur-like lamina; column short. Leaves either radical and long-stalked, or few and many-sheathed at the base of a simple stem. The species are not very ornamental. For culture of those given below, *see* **Goodyera.**

P. setacea (bristly). *fl.*, perigone greenish, about 1in. long; divisions linear, setaceous-acuminate; lip lanceolate, acuminate, ciliated; spur half-free, filiform, curved. *l.* elliptical, pointed, long-petioled, 3in. to 6in. long. *h.* 1ft. to 2ft. West Indies, 1834. (B. M. 3403, under name of *Neottia calcarata*.)

P. spiranthoides (Spiranthes-like). *fl.* greenish, with a white-variegated lip, disposed in a loose spike, 2in. to 8in. long; lip dilated at the summit into a roundish, bilamellate blade. *l.* elliptical, pointed, long-petioled, 4in. to 5in. long. *h.* 1ft. to 3ft. West Indies, 1823. (B. R. 985.)

P. triloba (three-lobed). *fl.* green, disposed in elongated, loose, many-flowered spikes; sepals acute, the lateral ones recurved; lip trilobed at apex. *l.* oblong, acute, shorter than the petioles. Brazil, 1870.

PELICAN FLOWER. A common name for *Aristolochia grandiflora*.

PELIOSANTHES (from *pelios*, livid, and *anthos*, a flower; alluding to the colour of the flowers of some species). SYNS. *Bulbospermum*, *Teta*. ORD. *Hæmodoraceæ*. A genus comprising about eight species of stove, perennial herbs, with short, horizontal rhizomes, natives of the East Indies and the Malayan Archipelago. Flowers greenish or lurid violet, rather small, disposed

Peliosanthes—*continued.*

in simple spikes or racemes, furnished with scarious bracts; perianth tube short above the ovary, broadly campanulate; limb rotate-spreading, of six broad, obtuse, sub-equal lobes; stamens six. Leaves radical, long-stalked, lanceolate or rather broad, acuminate at both ends, with elevated, sub-plicate veins; petioles sheathing at base. The species require a compost of loam, peat, and sand; they may be freely increased by suckers. The only two introduced to cultivation are described below.

P. humilis (humble). *fl.* greenish, in a rather dense raceme, 2in. to 6in. long; perianth segments thrice as long as the tube; scape 2in. to 6in. long. May. *l.* four to eight in a rosette, lanceolate, 3in. to 6in. long, 1in. to 2in. broad; petioles 6in. to 9in. long. Eastern Himalayas, 1809. (A. B. R. 634; B. M. 1532.)

P. Teta (Teta). *fl.* greenish, in a loose raceme, 6in. to 9in. long; scape 4in. to 6in. long. April. *l.* two to seven in a rosette, chartaceous, oblanceolate, nearly 1ft. long, 1½in. to 2½in. broad; petioles 6in. to 8in. long. Eastern Himalayas, 1807. (A. B. R. 605; B. M. 1302.)

PELLÆA (from *pellos*, dark-coloured; referring to the dusky colour of the fronds). Cliff Brake Fern. Including *Allosorus*, *Cheiloplecton*, *Holcochlæna*, and *Platyloma*. ORD. *Filices*. A widely-distributed genus, comprising about sixty species of stove and greenhouse ferns, with the habit of *Cheilanthes*. Sori intramarginal, terminal on the veins, at first dot-like or decurrent on the veins, but soon running into a line; involucre formed of the more or less changed edge of the frond, quite continuous, sometimes very narrow. For culture, &c., *see* **Ferns.**

P. andromedæfolia (Andromeda-leaved).* *sti.* 6in. to 9in. long, densely reddish-brown, scaly at base. *fronds* 6in. to 12in. long, 3in. to 6in. broad, ovate, tri- or quadri-pinnate; pinnæ rigid, erecto-patent, deltoid-lanceolate, the lowest with several linear-oblong pinnules, the lower segments of which are sometimes slightly branched: ultimate divisions about ⅛in. long, blunt, with inrolled edges. Involucre wrinkled, scarcely changed from the substance of the frond, and sometimes nearly meeting edge to edge. America and Cape Colony. Greenhouse.

FIG. 70. PELLÆA BRACHYPTERA.

P. angustifolia cuneata (narrow-leaved, wedge-shaped). *sti.* 6in. to 12in. long, tufted, strong, erect, dark chestnut-brown. *fronds* 6in. to 12in. long, 3in. to 6in. broad, oblong-deltoid, quadri-pinnatifid; pinnæ 2in. to 4in. long, lanceolate-deltoid; pinnules cut down to the rachis into oblong, acute segments, which are ½in. long, ⅛in. broad, cuneate at the base. Involucres broad, membranous, rolled over the sori. Mexico to Venezuela. Stove. (The type is figured in H. S. F. 119B, under name of *P. decomposita*.)

P. atropurpurea (dark purple).* *sti.* 3in. to 4in. long, tufted, rigid, tomentose. *fronds* 4in. to 12in. long, 2in. to 6in. broad, varying from lanceolate, and simply pinnate, to ovate-lanceolate, with deltoid pinnæ, which are 2in. to 3in. long, with several pinnules on each side, the latter nearly sessile, 1in. to 2in. long, hardly ¼in. broad, entire or sharply auricled at one or both sides at the base; rachis tomentose. Involucres formed of the slightly altered, incurved edge of the pinnules, at length nearly hidden by the broad line of the fruit. North America, &c., 1770. Greenhouse.

P. bella (handsome). *sti.* 3in. long, ebeneous. *fronds* 5in. to 6in. long, linear, bipinnate or sub-tripinnate; pinnæ ½in. to ⅝in. long, numerous, ovate, sessile; pinnules ⅛in. long, linear-oblong, four to six-jugate, mucronate, rounded at base, the lowest sometimes

Pellæa—*continued.*

bi- or ternate, the edges strongly revolute. California, 1873. Greenhouse.

P. brachyptera (shortly-winged).* *rhiz.* short-creeping, scaly towards the end. *sti.* 4in. to 6in. long, castaneous. *fronds* 4in. to 6in. long, lanceolate, bipinnate; pinnæ very short, sessile, semicircular, erecto-patent, the lower ones consisting of seven to nine narrow-linear pinnules, ⅛in. to ⅛in. long, with mucronate tips, rounded bases, and revolute edges. California, 1873. Greenhouse. This is regarded by some authorities as a variety of *P. ornithopus*. See Fig. 70, for which we are indebted to Messrs. W. and J. Birkenhead.

P. Breweri (Brewer's). *sti.* 2in. to 3in. long, tufted, flaccid, bright chestnut-brown, slightly scaly. *fronds* 3in. to 9in. long, 1in. to 1½in. broad, linear-lanceolate; pinnæ twelve to eighteen on each side, slightly stalked, broader in the barren than in the fertile frond, varying from lanceolate-oblong and entire to auricled at one or both sides at the base, or cut down nearly to the rachis in the lower part into oblong lobes. Involucres similar in colour and texture to the frond, broad, and much wrinkled. Cape Colony. Greenhouse.

P. Bridgesii (Bridges').* *sti.* wiry, erect, 2in. to 4in. long, bright chestnut-brown. *fronds* 4in. to 6in. long, 1in. or less broad, linear, simply pinnate; pinnæ six to eight on each side, sessile, oblong, entire, obtuse, cordate or rounded at base. *sori* in a broad, marginal line, with the much-wrinkled, membranous edge of the frond protruding beyond it till full maturity. California, 1875. Greenhouse. (H. S. F. 142B.)

P. Brownii (Brown's). A synonym of *P. paradoxa*.

P. calomelanos (beautiful-dark). *sti.* 4in. to 6in. long, strong, erect, dark brown. *fronds* 4in. to 8in. long, 3in. to 6in. broad, sub-deltoid, bi- or tripinnate; lower pinnæ rigid, spreading or erecto-patent, linear-oblong, and simply pinnate or deltoid and bipinnate; ultimate segments on rigid, black stalks, the lateral ones ½in. to ¾in. each way, varying in shape from cordate-oblong-obtuse to hastate-triangular, about as broad as long, the two sides at the base often unequal. *sori* in a broad, marginal line, soon hiding the narrow, membranous involucre. South Africa, 1830. Greenhouse. SYN. *Pteris hastata*. (B. M. 4769, under name of *Allosorus calomelanos*.)

P. consobrina (related). *sti.* 6in. to 12in. long, strong, erect, dark brown. *fronds* 6in. to 12in. long, 4in. to 9in. broad, deltoid, tri- or quadripinnatifid; lowest pinnæ deltoid, with the pinnules of the lower side larger than the others, these latter usually cut down into several lanceolate or deltoid, pinnatifid segments; simple ultimate divisions linear-oblong. *sori* in a continuous line along the margins; involucres moderately broad, membranous, the edge of the segments often inrolled. South Africa, &c. Greenhouse. (H. S. F. 117A.)

P. cordata (heart-shaped).* *sti.* 6in. to 9in. long, strong, erect, straw-coloured, when young scaly beneath. *fronds* 1ft. or more long, 4in. to 6in. broad, deltoid-lanceolate; pinnæ erecto-patent, deltoid-lanceolate, with a straight rachis, the lower ones slightly branched at the base; segments shortly stalked, oblong or ovate, rounded or cordate at base, ⅛in. to 1in. long, with a blunt point; rachis and both surfaces pubescent. *sori* in broad, marginal lines, which soon hide the involucres. Tropical America, 1820. Stove. (B. M. 4698, under name of *Allosorus cordatus*.) *P. sagittata* is regarded, by Mr. Baker, as a form of this species.

P. c. flexuosa (zigzag). A variety with zigzag rachises, the pinnæ and pinnules spreading at right angles, or even deflexed. 1838. Stove. SYN. *P. flexuosa*. (B. M. 4762, under name of *Allosorus flexuosus*.)

P. crispa (curled). A synonym of *Cryptogramme crispa*.

P. densa (dense). *sti.* 4in. to 6in. long, tufted, slender, wiry, chestnut-brown. *fronds* 2in. to 3in. long, 1in. to 1½in. broad, oblong-deltoid, tripinnate; pinnæ and pinnules crowded, deltoid or lanceolate; segments numerous, linear, with inrolled edges, sessile or shortly stalked, sharp-pointed or mucronate, the terminal ones largest, sometimes ¼in. long. Involucres broad, rigid, rolled permanently over the sori. North America. Greenhouse. (H. S. F. 125B.)

P. falcata (sickle-shaped).* *rhiz.* wide-creeping. *sti.* 3in. to 6in. long, strong, erect, pubescent and scaly. *fronds* 6in. to 18in. long, 1in. to 2in. broad, linear-oblong, simply pinnate; pinnæ ten to twenty on each side, lanceolate or lanceolate-oblong, ½in. to 1in. long, usually mucronate, often slightly falcate, cuneate or dilated and cordate at base; rachis densely scaly and tomentose. *sori* in broad, marginal lines, soon hiding the narrow involucres. Australia, &c., 1823. Greenhouse. (H. S. F. 11B.)

P. flexuosa (zigzag). A synonym of *P. cordata flexuosa*.

P. geraniæfolia (Geranium-leaved).* *sti.* 6in. to 9in. long, erect, wiry, brownish-black, slightly scaly towards the base. *fronds* 2in. to 4in. each way, deltoid, cut nearly to the rachis into three or four pinnæ on each side, of which the lowest pair is much the

Pellæa—*continued.*

largest, with the pinnules on the lower side much larger than the others, and deeply lobed, with linear-oblong segments. *sori* in broad, marginal lines. Tropics, &c. Stove.

P. glauca (glaucous). *sti.* 4in. to 8in. long, tufted, strong, erect, dark chestnut-brown. *fronds* 3in. to 4in. each way, deltoid, quadripinnatifid; lowest pinnæ much the largest, and the pinnules on the lower side larger than the others, lanceolate-deltoid, cut down to the rachis into segments, which are again cut down to the rachis below; ultimate divisions about ⅛in. long, linear-oblong, with inrolled edges, more or less crenate; lower surface and rachis tomentose. Involucres coriaceous, rolled down over the sori. Chili and Mexico. Stove. SYN. *Pteris glauca.*

P. gracilis (slender). *sti.* 2in. to 3in. long, scattered, slender, straw-coloured or pale brown. *fronds* 2in. to 4in. long, 1in. to 2in. broad, ovate, bi- or tripinnatifid; pinnæ deltoid-lanceolate, 1in. to 2in. long, cut down to the rachis; lower pinnules sometimes again slightly divided; ultimate segments of the barren frond obovate, slightly crenate; those of the fertile one linear-oblong, the terminal one much larger than the others. Involucres broad, continuous, membranous. North America, North India, &c. Greenhouse. (H. S. F. 133B.) SYNS. *P. Stelleri, Pteris gracilis, Pteris Stelleri.*

FIG. 71. PELLÆA HASTATA.

P. hastata (spear-shaped).* *sti.* 6in. to 12in. long, wiry, erect, dark chestnut-brown. *fronds* 6in. to 2ft. long, 6in. to 12in. broad, oblong, bi- or tripinnate; pinnæ erecto-patent, varying from simply pinnate to copiously bipinnate; ultimate divisions 1in. to 2in. long, ovate or lanceolate, not toothed, sessile or nearly so. *sori* in a narrow, continuous, marginal line; involucres rather narrow, membranous, nearly or quite hidden when the fruit is mature. South Africa. Greenhouse. See Fig. 71.

P. intramarginalis (involucred within margin). *sti.* 3in. to 6in. long, erect, tufted, dark chestnut-brown. *fronds* 6in. to 12in. long, 2in. to 4in. broad, ovate-lanceolate, bipinnatifid; pinnæ 2in. to 3in. long, lanceolate, opposite, cut nearly to the rachis into linear-oblong pinnules. *sori* copious, confluent, marginal; involucres broad, membranous, fringed. Mexico and Guatemala, 1841. Stove.

P. i. serratifolia (serrate-leaved). In this variety the pinnules are distinctly toothed. SYN. *Pteris fallax.*

P. involuta (involute). *sti.* 2in. to 3in. long, wiry, erect, blackish, tufted. *fronds* 3in. to 4in. long, 1in. to 1½in. broad, oblong-lanceolate, tripinnatifid; lower pinnæ opposite, deltoid-lanceolate, cut down to the rachis into several deltoid pinnules, the upper of which are ternately lobed, the lower cut down to the rachis below. *sori* continuous; involucres distinct and pale, membranous. Cape Colony, &c. Greenhouse.

P. longimucronata (long-mucronate). A synonym of *P. mucronata.*

P. mucronata (mucronate). *sti.* 2in. to 4in. long, tufted, erect, dark brown. *fronds* 3in. to 6in. long, 1in. to 3in. broad, deltoid, bipinnate; pinnæ 1in. or more long, spreading or erecto-patent, rigid, with several distant, linear-oblong pinnules on each side, about ¼in. long, with inrolled edges and a sharp, mucronate point. Involucres broad, coriaceous, rolled permanently over the sori. Mexico, &c., 1865. Nearly hardy. SYNS. *P. longimucronata* (H. S. F. 115A), *P. Wrightiana* (H. S. F. 115B).

P. ornithopus.* Bird's-foot Fern. *sti.* 3in. to 6in. long, tufted, rigid, dark chestnut-brown. *fronds* 4in. to 6in. long, 2in. to 3in. broad, deltoid, bipinnatifid; pinnæ 1in. to 1½in. long, ¼in. to ⅜in. broad, rigid, spreading, with numerous, distantly-placed, sessile pinnæ on each side, which are cut to the base into three linear, mucronate segments, of which the central one is the largest. Involucres broad, coriaceous, crenate, rolled permanently over the sori. California 1875. Greenhouse. (H. S. F. 116A.)

P. paradoxa (paradoxical). *sti.* 6in. to 9in. long, strong, erect, dark brown, sometimes slightly tomentose. *fronds* 6in. to 9in. long, 4in. to 6in. broad, oblong, simply pinnate; pinnæ four to six on each side, short-stalked, with a considerable space between them, 1½in. to 2in. long, lanceolate, entire, acute or bluntish, cordate or rounded at the base; rachis tomentose. *sori* in a marginal line, often ⅛in. broad, soon hiding the involucre. Australia. Greenhouse. (H. S. F. 111A.) SYN. *P. Brownii.*

P. pulchella (pretty). *sti.* 2in. to 3in. long, wiry, erect, dark chestnut-brown, tufted. *fronds* 3in. to 6in. long, 1in. to 3in. broad, oblong, tripinnate; lower pinnæ deltoid; pinnules lanceolate; ultimate segments very deciduous, oblong, blunt, about ⅛in. long and half as broad; edges of the fertile segments much inrolled. Involucres broad, permanently rolled over the sori. Andes of tropical America. Stove.

FIG. 72. PORTION OF FROND OF PELLÆA ROTUNDIFOLIA.

P. rotundifolia (round-leaved).* *rhiz.* stout, scaly, creeping. *sti.* 6in. to 12in. long, stout, erect, more or less pubescent and scaly. *fronds* 6in. to 12in. long, 1in. to 1½in. broad, linear, simply pinnate; pinnæ ten to twenty on each side, short-stalked, oblong or roundish, entire, obtuse or mucronate at the apex; rachis densely scaly and tomentose. *sori* in a broad, marginal line, soon hiding the involucre. New Zealand and Norfolk Island, 1841. Greenhouse. See Fig. 72.

P. sagittata (arrow-like). A variety of *P. cordata.*

P. Stelleri (Steller's). A synonym of *P. gracilis.*

P. ternifolia (ternate-leaved). *sti.* 2in. to 4in. long, strong, erect, dark chestnut-brown, densely fibrillose at base. *fronds* 6in. to 12in. long, 1in. to 1½in. broad, lanceolate-linear, with six to twelve opposite pairs of pinnæ, which are cleft nearly to the base into three linear, mucronate, rigid segments, with inrolled edges. Involucres formed out of the edge of the frond, rolled over the sori till they attain full maturity. Tropical America, 1841. Stove.

P. Wrightiana (Wright's). A synonym of *P. mucronata.*

PELLIONIA (named after A. M. J. Alphonse Pellion, an officer in Freycinet's voyage round the world). ORD. *Urticaceæ.* A genus comprising fifteen species of mostly stove herbs, often creeping at base, rarely suffruticose; they inhabit tropical and Eastern Asia, as far as Japan, and the Pacific Islands. Flowers dicœcious or moncœcious, densely cymose or sub-capitate; perianths of five, rarely four, divisions. Leaves variable. The only species introduced are stove, creeping, perennial herbs, with ornamental foliage. They thrive in rich, sandy loam, and require a moist atmosphere. Propagated by divisions, or by cuttings.

Pellionia—*continued.*

P. Daveauana (Daveau's).* *fl.* green; females very minute; males six to eight times larger; perianths five-parted; inflorescence pedunculate, densely cymose. August. *l.* alternate, stipulate, ¾in. to 2¼in. long, oblique, roundish-elliptic or elliptic-oblong, obtuse, dark bronzy-olive-green, slightly tinted with violet, or marked with a broad, central, irregular band of bright green. Stems succulent. Cochin China, 1880. A charming creeper. SYN. *Begonia Daveauana.* (I. H. n. s. 472.)

P. D. viridis (green). *l.* uniformly bright green, with whitish blotches. Stem, as well as the petioles, midrib, and veins of the leaves, sparsely hairy. 1882.

P. pulchra (pretty).* *l.* alternate, petiolate, stipulate, obliquely oblong, very obtuse, obliquely cordate at base; upper surface dull blackish along the midrib and veins; under surface pale, and rather delicate purplish; primary veins five on each side. Stem fleshy, creeping, tinged with a dull purplish colour. Cochin China, 1852. Plant glabrous, except a few hairs on the upper side of the petioles. (I. H. 479.)

PELLITORY. *See* **Pyrethrum Parthenium.**

PELONASTES. Included under **Myriophyllum** (which *see*).

PELORIA. "An irregular flower, become regular by a monstrous development of complementary irregularities" (Asa Gray).

PELTANDRA (from *pelte*, a target, and *aner*, *andros*, a stamen; alluding to the shape of the stamens). SYNS. *Lecontia*, *Rensselaeria*. ORD. *Aroideæ* (*Araceæ*). A genus comprising only a couple of species of hardy, marsh-loving, perennial herbs, with very slender rhizomes, natives of North-eastern America. Spathe convolute, with an elongated, persistent tube, and the margins of the lamina undulated; spadix much shorter than the spathe, slender, erect, cylindrical, almost entirely covered, except at the top, with densely-crowded flowers. Leaves sub-peltate, hastate, with very slender, dense nerves; petioles long, sheathing. *P. virginica*, the species best known in gardens, must be grown, like *Calla*, in shallow water, in a sunny, sheltered pond.

P. virginica (Virginian). Arrow Arum. *fl.* thickly covering the long and tapering spadix throughout; "upper portion of the spathe, and sterile portion of the spadix, rotting away after florescence, leaving the fleshy base firmly inclosing the globular cluster of fruit" (Asa Gray). June. *l.* large, pointed; nerves reticulated next the margin. A. 1ft. 1759.

PELTANTHERA. A synonym of **Vallaris** (which *see*).

PELTARIA (from *pelta*, a small buckler; alluding to the form of the pods). ORD. *Cruciferæ*. A genus comprising three species of hardy, tall, glabrous, perennial herbs, natives of South Europe, Asia Minor, Syria, and Persia. Flowers white, sub-corymbose. Pods large; fructiferous pedicels patent or recurved, filiform, ebracteate. Leaves entire, cauline ones cordate-sagittate at base. *P. alliacea* is a pretty little plant. It flourishes in any light soil, and may be increased either by seeds, or by division.

P. alliacea (Onion-scented).* *fl.*, calyx equal; petals entire. June. Pods flat, smooth. *l.*, cauline ones sagittate-amplexicaul. A. 1ft. Eastern Europe, 1561. The plant emits a Garlic-like odour. (J. F. A. 125.)

PELTATE. Target-shaped; shield-like. A leaf is said to be Peltate when the petiole is attached to the lower surface instead of to the margin. See Fig. 73.

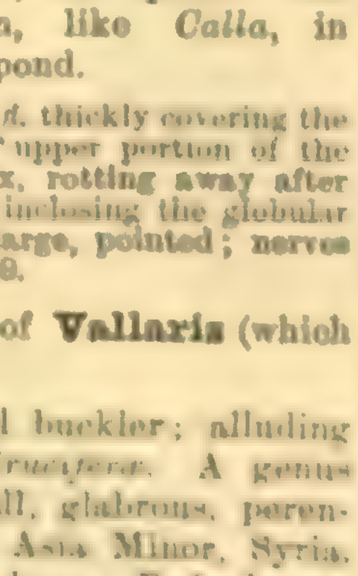


FIG. 73. PELTATE LEAF OF INDIAN CRESS.

PELTATIFID. When a peltate leaf is sub-divided.

PELTINERVED. Radiately-nerved. When the nerves of a leaf are disposed in a peltate manner.

PELTOPHORUM (from *pelte*, a small shield, and *phoreo*, to bear; in reference to the shape of the stigma). ORD. *Leguminosæ*. A genus of about half-a-dozen species of tall, unarmed, stove trees, of which two or three are tropical American, one is found in South-eastern Africa, and two in the Indian Archipelago and tropical Australia. Flowers yellow, racemose; calyx segments five, imbricated; petals five, orbicular, spreading, much-imbricated; racemes paniculate, at the tips of the branches. Pods oblong-lanceolate, rarely elongated, flat-compressed, indehiscent. Leaves bipinnate; leaflets small, numerous. *P. Linnæi* is described in this work as *Cæsalpinia brasiliensis*.

PELTOSTIGMA (from *pelte*, a buckler, and *stigma*; alluding to the protuberance of the stigma). SYN. *Pachystigma*. ORD. *Rutaceæ*. A monotypic genus. The species is a very glabrous, low, fragrant, stove, evergreen tree. It thrives in sandy loam and fibry peat. Propagated by cuttings, inserted under a bell glass, in heat.

P. ptelcoides (Ptelea-like). *fl.* white, rather large, puberulous outside, disposed in fastigiate, long-stalked, few-flowered, trichotomous cymes; sepals three or four, free, deciduous, two outer ones smaller; petals four, broadly obovate, concave; pedicels with leafy bracts. February. *l.* alternate, trifoliolate; leaflets elliptic, sub-entire, gland-dotted. Jamaica, 1844.

PELVIFORM. Shallowly cup-shaped; basin-like.

PEMPHIGUS. A genus of Aphides, distinguished from the more frequently observed forms by the six-jointed, short antennæ, the absence of honey tubes near the end of the body, and the front wings having all the veins that end on the hind margin unbranched. The body is generally more or less bedecked with a woolly secretion, especially near the tip. Several species are found in Britain. Of these, some form galls on Elms, and on Poplars (*e.g.*, *P. bursarius* on leafstalks of the Black Poplar), while most of them feed on the roots of plants, especially of *Compositæ* and of grasses. The latter species may be found in small companies, in cavities, loosely lined with the white secretion. The insects prefer light, sandy soils. *P. lactucarius* and *P. fuscifrons* both injure garden Lettuces considerably at times. *See* **Lettuce.** M. Lichtenstein, of Montpellier, has brought forward strong arguments in support of the belief that the gall-makers pass through a cycle, in which a generation of gall-makers on trees alternates with one feeding on the roots of herbaceous plants; and he has proved that this occurs with the allied *Tetraneura Ulmi*, the maker of the erect galls (about the size of small Cherry-stones), common on Elm leaves in various English localities. This species of *Aphis* he has traced from the Elm galls to roots of Maize, and of *Cynodon dactylon*, and *vice versâ*.

PENÆA (named after P. Pena, author, with Lobel, of "Adversaria Botanica," 1570). ORD. *Penæaceæ*. A small genus (nine species) of very dwarf-growing, greenhouse, evergreen, much-branched, densely leafy shrubs, natives of South Africa. Flowers yellow or reddish, solitary, axillary, at the ends of the branches, forming leafy spikes; perianth tube oblong-cylindrical or ovoid, the lobes of the limb valvate. Leaves opposite, sessile, entire, coriaceous; floral ones more conformed, or broader and shorter, than the cauline ones. It is doubtful whether those species described below are still in cultivation. They require a sandy-peat soil. Propagation may be effected by cuttings, inserted in sand, under a glass.

P. mucronata (mucronate). *fl.* and bracts yellow or purplish. June. *l.*, lower ones ovate, acute, caducous; middle ones ovate, acuminate, broadly sub-cordate at base; uppermost ones reduced to bracts. A. 2ft. 1787. (L. B. C. 1770.)

P. myrtoides (Myrtle-like). *fl.* red. June. *l.* sessile, ovate or ovate-elliptic, obtuse, flat. A. 2ft. 1816.

P. squamosa (scaly). A synonym of *Sarcocolla squamosa*.

PENÆACEÆ. A small natural order of much-branched shrubs, confined to South Africa, and of doubtful affinity with any other order. Flowers hermaphrodite, regular, solitary in the upper axils, sub-sessile; perianth

Penæaceæ—*continued.*

inferior, with an ovoid or cylindrical tube, and a limb of four valvate or reduplicate-margined lobes; stamens four, affixed to the throat; filaments short; anthers continuous with the filaments, erect, two-celled. Capsule included in the persistent perianth. Leaves opposite, numerous, rather small, entire, coriaceous; stipules absent. The order comprises four genera and about a score species, none of which have any known economic value. Examples: *Penæa, Sarcocolla.*

PENANG LAWYERS. *See* **Licuala acutifida.**

PENCIL FLOWER. *See* **Stylosanthes.**

PENDULOUS. *Drooping; hanging down.*

PENICILLATE. Resembling a pencil; consisting of, or covered with, tufts of hairs.

PENNATE. The same as **Pinnate** (which *see*).

PENNIFORM. Feather or plume-shaped.

PENNINERVED, PENNIVEINED. Having main veins or ribs running straight from the margins at equal distances.

PENNISETUM (from *penna*, a feather, and *seta*, a bristle; referring to the long, feathered bristles of the flower-spikes). Including *Gymnothrix*. ORD. *Gramineæ*. A rather large genus (nearly forty species) of tropical and sub-tropical grasses, mostly African, and principally requiring greenhouse treatment. Spikelets two to four, in a simple spike, involucrate; bristles distinct, deciduous with the spikelet, the interior plumose below. Sterile glumes three, or two by abortion of the lowest, membranous. Many of the species are very ornamental, and well worth growing. They are usually annuals, and are of very easy culture in ordinary garden soil. Propagated by seeds. The following are desirable plants:

P. cenchroides (Cenchrus-like). *fl.*, spikes 1in. to 3in. long; spikelets ascending, sessile, crowded, oblong, acute, ⅛in. long, densely plumose in the lower part. *l.* linear, acute, glabrous. Stems 1ft. to 2ft. long, ascending, branched. Warm regions of both hemispheres, 1777. Annual.

P. compressum (compressed). *fl.*, involucres nearly sessile, in a simple, cylindrical, dense spike of 3in. to 6in., consisting of numerous, very unequal bristles. *l.* long and narrow, glabrous, the ligula prominent. Stems 2ft. to 3ft. high, erect, scabrous, and more or less hirsute under the panicle. Australia, 1820 Annual.

P. latifolium (broad-leaved).* *fl.*, inflorescence consisting of amentiform, nodding spikes. *l.* broad-lanceolate, spreading, bright green, with the broad median vein whitish; ligule short, hairy. Stems robust-growing, cane-like, attaining a height of from 9ft. to 10ft. Monte Video, 1869. A very ornamental perennial, forming handsome tufts. It may be grown in the open air during the summer months; the roots should be taken up at the approach of winter, and placed under cover. SYN. *Gymnothrix latifolia.* (R. H. 1869, 69.)

FIG. 74. PENNISETUM LONGISTYLUM.

P. longistylum (long-styled).* *fl.*, inflorescence in spikes from 4in. to 6in. long, having a singularly twisted appearance, and enveloped in a feathery down of a purplish colour. August.

Pennisetum—*continued.*

l. narrow and gracefully arching. *h.* 1ft. to 1½ft. Abyssinia. An elegant species, generally treated as a half-hardy annual. See Fig. 74.

P. setosum (bristly). *fl.*, spikes purple, very dense, 6in. long; involucre of a dozen or more fine bristles, densely plumose in the lower part. *l.* linear, acute, glabrous or pilose. Stems 3ft. to 4ft. long. Tropical America, 1817. An erect perennial.

PENNY GRASS. *See* **Rhinanthus crista-galli.**

PENNY PIES. A common name applied to the leaves of *Cotyledon Umbilicus.*

PENNYROYAL (*Mentha Pulegium*). This hardy perennial is a native of Europe (Britain), North and West Asia, &c., and is cultivated for the occasional use of its leaves or tops in culinary preparations. It succeeds best in loamy soil, and in a moist situation. Propagation may be readily effected by division, in autumn or spring. In planting, allow a space of about 12in. between rows, and 6in. between plants in the row; water shortly afterwards, should the weather be dry.

PENNYWORT, or **PENNYLEAF.** A name applied to *Cotyledon Umbilicus, Hydrocotyle vulgaris, Linaria Cymbalaria,* and *Sibthorpia europæa.*

PENSTEMON. *See* **Pentstemon.**

PENTA. In Greek compounds, this signifies five; *e.g.*, Pentagonal, five-angled.

PENTACHÆTA (from *pente*, five, and *chaite*, a bristle; alluding to the five bristles at the base of the pappus). ORD. *Compositæ.* A small genus (four species) of greenhouse or hardy, small, slender, annual herbs, natives of California and Mexico. Flower-heads yellow, mediocre or rather small, solitary at the tips of the branches, radiate; ray-florets uniseriate; involucre hemispherical or broadly campanulate; receptacle flat or slightly convex, naked; achenes somewhat silky-villous. Leaves alternate, linear, entire, or rarely almost opposite and denticulate. *P. aurea*, the only species yet introduced, is readily grown from seeds, sown in sandy loam, in warm, sunny spots, in spring.

P. aurea (golden). *fl.-heads* golden-yellow, 1in. in diameter; ray-florets twenty to fifty. *l.* numerous, sessile, filiform-linear. *h.* 2in. to 3in. California, 1884. A pretty, dwarf, umbellately-branched, hardy herb. (R. G. 1153.)

PENTADACTYLON. A synonym of **Persoonia** (which *see*).

PENTADESMA (from *pente*, five, and *desma*, a bundle; the stamens are disposed in bundles of five). ORD. *Guttiferæ.* A monotypic genus, the species being a tall, stove tree, yielding a yellow, greasy juice (whence the popular name). It succeeds best in a mixture of loam and peat, and in a strong, moist heat. Propagation is effected by ripened cuttings (with their leaves not shortened), inserted in sand, under a glass, in a moist heat.

P. butyracea (buttery). Butter-and-Tallow-tree. *fl.* red, large, handsome, solitary and terminal; sepals passing gradually into the petals, which are imbricate, but scarcely contorted. November. *fr.* an edible berry. *l.* opposite, coriaceous, and elegantly marked with numerous parallel veins. Tropical Africa, 1822.

PENTAGONIA (from *pente*, five, and *gonia*, an angle; referring to the divisions of the corolla). ORD. *Rubiaceæ.* A genus comprising about eight species of stove shrubs, natives of tropical America. Flowers yellow, red, or greenish, large, but inconspicuous when compared with the foliage, in dense, axillary corymbs, sessile or nearly so; calyx with a turbinate, sub-cylindrical, or campanulate tube, and a spathaceous, or five or six-lobed limb; corolla funnel-shaped or tubular, thickly coriaceous, the limb of five or six valvate lobes. Leaves large, opposite, coriaceous, entire or pinnatifid, with large stipules. Branchlets thick, terete. For culture of *P. Wendlandi*—the only species yet introduced—*see* **Cinchona.**

Pentagonia—*continued.*

P. Wendlandi (Wendland's). *fl.* yellow, produced in clusters from the axils of the upper leaves; corolla tubular-sub-urceolate. July. *l.* very shortly petiolate, coriaceous, obovate-lanceolate, slightly acute, rounded at base, some of them 1½ft. long; petioles thick, naked. *h.* 2ft. 1861. (B. M. 5230.)

PENTAGYNIA. A Linnæan artificial order, characterised by five-styled flowers.

PENTAMEROUS. Consisting of five members in a circle.

PENTANDRIA. A Linnæan class, characterised by its flowers having five stamens.

PENTAPERA (from *pente*, five, and *pera*, a bag; referring to the five-celled ovary). ORD. *Ericaceæ*. A monotypic genus, the species being an ornamental, half-hardy, evergreen, Heath-like shrub. For culture, *see* **Erica.**

P. sicula (Sicilian). *fl.* flesh-coloured or white, sub-terminal, fasciculate, pedicellate, three-bracteate, nodding, rather large for the plant; sepals five, equal, ovate, acute, persistent; corolla marcescent, much larger than the calyx, globose-sub-urceolate, the lobes revolute, contorted. May. *l.* erecto-patent, verticillate, linear-oblong, obtuse, coriaceous, entire. *h.* 2ft. Sicily and Malta, 1849. Plant pubescent. SYN. *Erica sicula.*

PENTAPETES (from *pentapetes*, five-leaved, a name given by Theophrastus to the Cinquefoil; referring to the pentamerous arrangement of the flowers). ORD. *Sterculiaceæ*. A monotypic genus. The species is a showy, stove annual, thriving best in a compost of sandy loam and leaf mould. It may be increased by cuttings of half-ripened shoots, or by seeds.

P. phœnicea (scarlet).* *fl.* scarlet, rather large; calyx five-parted; petals five, broad; peduncles short, axillary, one-flowered. July. *l.* simple, lanceolate, halbert-shaped, serrated. *h.* 2ft. to 3ft. Tropical Asia, 1690. (B. R. 575.)

P. suberifolia. *See* **Pterospermum suberifolium.**

PENTAPHILTRUM. A synonym of **Physalis** (which *see*).

PENTAPHRAGMA. A synonym of **Physianthus** (which *see*).

PENTAPTERA. Included under **Terminalia** (which *see*).

PENTAPTERYGIUM (from *pente*, five, and *pterygion*, a small wing; in allusion to the five-winged calyx). ORD. *Vacciniaceæ*. A genus comprising about half-a-dozen species of greenhouse, glabrous or strigoso-hirsute, epiphytal shrubs, natives of the Eastern temperate Himalayas and the Khasia Mountains. Flowers red, yellow, or white bedewed with red, rather large, axillary, solitary, or disposed in few-flowered corymbs; calyx tube turbinate or hemispherical, five-winged; limb of five persistent, leafy lobes; corolla tubular, five-angled, with a limb of five sub-erect or recurved lobes; stamens ten. Leaves alternate, sub-sessile, rather large and scattered, or small and sub-distichously clustered, serrate. The species require well-drained peat, and may be grown either in teak baskets or in pots. Propagation may be effected by cuttings, inserted in sand, under a bell glass.

P. flavum (yellow).* *fl.* yellow, margined with red, 1in. long, on red pedicels, disposed in short, axillary, pendulous or nodding racemes; corolla tubular, inflated, with five small lobes. *l.* 2in. to 3in. long, ovate-lanceolate, acuminate, serrate, very shortly petioled, rugose above, paler below. *h.* 1ft. to 3ft. North-eastern India. (B. M. 4910.)

P. rugosum (wrinkled).* *fl.* pendulous, about 1in. long, in few-flowered corymbs; corolla nearly white, beautifully marbled between the five angles with purple or blood-red bands, the mouth contracted and greenish. *l.* almost sessile, sub-cordate at base, very much wrinkled, lanceolate or ovate-lanceolate, acuminate, serrate, deep bright green above, paler beneath; young ones purplish. *h.* 1ft. to 3ft. Khasia Mountains. (B. M. 5198.) SYN. *Vaccinium rugosum.*

P. serpens (serpentine). *fl.* numerous, axillary, hanging along the under side of the branches; calyx green, five-angled; corolla bright red, with darker, V-shaped marks, ¾in. long. *l.* small, lanceolate. Stems slender, drooping. Rootstock large, tuberous. *h.* 2ft. to 3ft. Himalayas, 1884. A small and graceful shrub. (B. M. 6777.)

PENTARHAPHIA (from *pente*, five, and *raphis*, a needle; referring to the form of the open calyx). SYNS. *Conradia. Gesneria.* ORD. *Gesneraceæ*. A genus of about forty species of stove, branched shrubs, or low sub-shrubs, mostly natives of the West Indies, a few being also found in Columbia or Central America. Calyx with an obconical or turbinate tube and five equal, narrow lobes; corolla usually scarlet (sometimes green?), with an incurved tube, and an oblique or sub-bilabiate five-lobed limb; pedicels elongated and solitary in the axils, or shorter and fascicled, or on an axillary, trichotomous, many-flowered peduncle. Leaves alternate, at the tips of the branches, or often crowded on short stems, frequently oblique. The following species are those best known in gardens. For culture, *see* **Gesnera.**

P. cubensis (Cuban). *fl.* scarlet, tubular, about 1in. long, solitary in the axils of the leaves; peduncle brown, 1in. long. Summer. *l.* dark green, convex, evergreen, obovate, crenated near the point, and netted on the under side with green veins on a pale ground. *h.* 2ft. Cuba, 1854. A compact-habited shrub. (B. M. 4829; F. d. S. 297.)

P. floribunda (bundle-flowered).* *fl.* red, numerous, axillary, tubular, distended above the middle, the limb shortly three-lobed and irregular, the throat open. Summer. *l.* lanceolate, bullate above. Cuba, 1878. A dwarf, bushy-habited sub-shrub, more or less covered with close, reddish down. (R. H. Jan. 16, 1878.)

P. libanensis (Mont-Liban).* *fl.* crimson, fascicled in the axils; corolla tube longer than the lobes; pedicels short, at length excrescent. June. *l.* spathulate-oblong, unequally serrate, and repand, membranous, roughish, rugose, scabrous on the ribs beneath. *h.* 4in. Jamaica, 1847. Sub-shrub. (B. M. 4380, under name of *Gesnera libanensis*; F. d. S. 178, under name of *Rhytidophyllum floribundum.*)

P. neglecta (neglected). *fl.* on short, one-flowered peduncles; corolla tube broadly campanulate, as long as, or longer than, the broad lips. September. *l.* spathulate-oblong, bluntish, crenate above, tapering into the short petiole, membranous. *h.* 4in. Jamaica, 1847. Sub-shrub.

PENTAS (from *pente*, five; referring to the generally pentamerous arrangement of the flowers). SYNS. *Orthostemma, Vignaldia.* ORD. *Rubiaceæ*. A genus comprising six or eight species of stove, erect or prostrate, hispid-pilose or tomentose, herbs or sub-shrubs, with

FIG. 75. FLOWERING BRANCH AND DETACHED FLOWER OF PENTAS CARNEA.

terete branches, natives of tropical and South sub-tropical Africa, and Madagascar. Flowers lilac, bracteate, disposed in short or elongated, terminal, corymbose cymes, sometimes sub-capitate; calyx four to six-lobed; corolla funnel-shaped, with an elongated tube and four to six ovate-oblong, spreading, valvate lobes. Leaves opposite, petiolate, ovate or ovate-lanceolate; stipules much cut or bristly. The species, only two of which have been introduced, are of easy culture, in a compost of loam and leaf mould, with a little sand added. Propagated, in spring or at almost any season, by cuttings of the young shoots, inserted in sandy soil, and placed

Pentas—*continued.*

under a propagating glass, in gentle heat. The plants should be occasionally pinched as they grow, to encourage a more compact habit.

P. carnea (flesh-coloured).* *fl.* disposed in numerous, large, cymose heads. Winter, and almost all the year round. *l.* soft, opposite, bright green. *h.* 1½ft. South Africa, 1842. A handsome, compact-growing, soft-wooded sub-shrub. See Fig. 75. (B. M. 4086; B. R. 1844, 32.)

P. c. kermesina (carmine).* A showy plant, differing from the type chiefly in having flowers of a lively carmine-rose, tinted with violet in the throat. (R. H. 1870, 130.)

P. parviflora (small-flowered). *fl.* flame-colour; corolla tube twice or thrice as long as the calyx. April. *l.* ovate or oval-oblong, acuminate, narrowed at base, scarcely puberulous on the veins. *h.* 2ft. Western tropical Africa, 1846. Sub-shrub.

PENTATAXIS. Included under *Helichrysum.*

PENTLANDIA. Included under **Urceolina** (which *see*).

PENTSTEMON (from *pente*, five, and *stemon*, a stamen; the fifth stamen being present and conspicuous, although sterile). Beard-tongue. SYN. *Penstemon.* ORD. *Scrophularineæ.* A genus comprising about sixty-six species of very ornamental, mostly hardy, perennial herbs or sub-shrubs, natives of (mostly Western) North America, including Mexico. Flowers red, violet, blue, white, or rarely yellowish-white, showy; calyx of five imbricated segments; corolla tube usually elongated, equal or ventricose; limb bilabiate, the upper lip two-lobed, and the lower three-cleft, bearded or naked; stamens four, didynamous, shorter than the corolla, the staminode filiform, with a clavate or spathulate tip, generally much shorter than the stamens; peduncles dichotomously many-flowered, bracteate at the ramifications and disposed in a terminal panicle or thyrse, which is often leafy at base, rarely one-flowered, and disposed in a simple raceme. Leaves opposite, the radical and lower ones petioled, graduating into amplexicaul floral ones, or decreasing into bracts. Flowering branches often erect, simple, rarely diffusely branched. Amongst popular hardy plants, few surpass Pentstemons for their usefulness and ornamental character in the mixed border or rock-garden, or for planting in beds by themselves. Their flowering season commences about June, and continues until after the appearance of frost, in autumn. Many of the species are very attractive, and are indispensable in the choicest collection of herbaceous plants; and a selection from the numerous varieties, improved so much of late years, is equally valuable for garden decoration and for cut flowers.

Pentstemons are very varied in colour, and possess a naturally graceful and exceedingly floriferous habit. They may readily be propagated from seeds, and also from cuttings; the latter method being most generally adopted for perpetuating species and named varieties. Seeds may, however, sometimes be obtained, in favourable seasons, from plants that do not readily produce cuttings; under such circumstances, it is most important to collect them, if required for increasing stock. If preserved from named varieties, with a view to raising new ones, only such as have finely-formed flowers and distinct colours should be selected for seed-bearing. Seeds should be sown in pans or shallow boxes of light soil, about February, or early in March, and placed on a gentle hotbed. So soon as the seedlings are large enough to handle, they should be potted off singly, or pricked into boxes, and kept in a little warmth until established, when they may be gradually hardened and placed in a cold frame. Towards the end of May, plant them in a prepared border outside, where, if properly attended to, many will flower in the ensuing autumn. Seeds may also be sown, in the open ground, early in June, when the plants should be potted up in August, and preserved in cold frames through the winter, for flowering early the following year, after being again

Pentstemon—*continued.*

transferred to the outside. Cuttings root readily at almost any season when they are procurable. The best time to take them is in August and September, from the numerous side-growths that are usually plentiful at that season. They may be inserted in cutting-pots or pans, and placed in a close frame without artificial heat, or, failing this, under a hand glass, in a sheltered position, where coverings may be readily applied, if necessary, afterwards. For the winter, the plants succeed best in a cold frame; they may be put into permanent quarters again, outside, during April, or earlier, should the weather be favourable. It is important, first, to expose them for a few days, in order to thoroughly harden them, and avoid an undue check.

Although Pentstemons are hardy, they frequently succumb when subjected successively to wet and frost, the first-named being, perhaps, the more destructive of the two. It is important, therefore, to provide good drainage, particularly for any of the more select species or varieties. A sandy loam, enriched with leaf mould or decayed manure, should be the compost prepared, if necessary, or these ingredients may be added to fairly good soil in borders for enriching it. Pentstemons well repay for liberal treatment and a rich soil. They require plenty of water throughout the summer; it is in winter when they suffer from being too wet. The best plan is to insert cuttings annually, and preserve a stock in a cold frame. If any old plants are to kept outside, they should be covered, in autumn, with ashes.

The species and varieties best known to gardeners are described below; except where otherwise indicated, they are hardy, herbaceous perennials.

P. acuminatus (taper-pointed). *fl.* lilac, or changing to violet; corolla tube scarcely enlarged above; sterile filament bearded above; panicle strict, interrupted; cyme sessile, crowded. July. *l.* entire; radical ones petioled, oblong or ovate, obtuse, mucronulate; upper ones cordate, clasping. Stem erect, 1ft. high. 1827. (B. R. 1285.)

P. angustifolius (narrow-leaved). A synonym of *P. campanulatus.*

FIG. 76. PENTSTEMON BARBATUS, showing Habit and portion of detached Inflorescence.

P. antirrhinoides (Snapdragon-like).* *fl.* lemon-yellow; corolla ventricose, naked, with large lips; sterile filament densely bearded on one side; peduncles two-leaved, often one-flowered. Summer. *l.* spathulate-lanceolate or oval, sub-petiolate, rather small, entire. *h.* 9in. to 18in. 1824. Plant sub-cinereous, much-branched. (B. M. 6157.)

P. atropurpureus (dark purple). A synonym of *P. campanulatus.*

P. attenuatus (attenuated) *fl.* yellowish-white or bluish-purple, variable; corolla more than ½in. long; inflorescence villous or viscous-pubescent. July. *l.* very glabrous, nearly always entire, rarely slightly denticulate; cauline ones lanceolate or oblong. *h.* 1½ft. to 2ft. 1827. (B. R. 1295.)

P. azureus (azure-blue).* *fl.*, corolla of a beautiful azure-blue, reddish-purple at the base of the tube, more than 1in. long;

Pentstemon—*continued.*

panicle twiggy; peduncles one to three-flowered. August. *l.*, cauline ones narrow or broad- or ovate-lanceolate; lower ones sometimes spathulate-oblong; upper ones closely sessile from the base, broadly sub-cordate-ovate or ovate-lanceolate. *h.* 1ft. 1858. Plant very glabrous, glaucous. (L. J. F. 211; P. F. G. 64.)

P. a. Jaffrayanus (Jaffray's). *fl.* blue, large; peduncles one to five-flowered. *l.* oblong or oval, or the upper ones ovate-lanceolate or ovate, very glaucous. *h.* 1ft. 1858. (B. M. 5045, under name of *P. Jaffrayanus.*)

P. baccharifolius (Baccharis-leaved).* *fl.* scarlet, showy, paniculate; corolla enlarged above, the upper lip sub-erect, the lower one reflexed. September. *l.* coriaceous, oblong, in rather distant pairs, nearly sessile, rigidly and acutely dentate. *h.* 1½ft. 1848. A well-marked, showy, half-hardy sub-shrub. (B. M. 4627.)

P. barbatus (bearded).* *fl.* varying from light pink-red to carmine; corolla tubular, the upper lip erect and concave, the lower deflexed and bearded at the throat; panicle twiggy, loose-flowered. July. *l.* entire; cauline ones sessile, lanceolate or linear-lanceolate. *h.* 3ft. 1794. Plant tall, many-flowered. See Fig. 76. (B. R. 1839, 21, a flesh-coloured variety, *carneum.*) SYNS. *Chelone barbata* (B. R. 116), *C. ruelloides* (A. B. R. 34).

FIG. 77. UPPER PORTION OF PLANT OF PENTSTEMON DIFFUSUS.

P. b. Torreyi (Torrey's).* *fl.* deep scarlet-red: throat of corolla naked or very slightly bearded; lips somewhat longer than in the type. Half-hardy. SYN. *P. Torreyi.*

P. breviflorus (short-flowered).* *fl.*, corolla yellowish or flesh-coloured, pink-striped within, about ½in. long, the upper lip beset with viscid hairs; thyrse narrow, many-flowered, racemiform. September. *l.* lanceolate or oblong-lanceolate, denticulate,

Pentstemon—*continued.*

seldom (if ever) whorled, 1in. or more long. Branches slender, twiggy. *h.* 3ft. to 6ft. (B. R. 1946.)

P. campanulatus (campanulate).* *fl.* varying in shades of pink, dark purple, violet, &c.; corolla tubular or campanulate-ventricose; sterile filament slightly bearded; panicle elongated, naked, raceme-like, secund. June. *l.*, cauline ones distinctly lanceolate, ovate-lanceolate, or linear, argutely serrated. *h.* 1½ft. 1794. (B. M. 1878, 3884.) SYNS. *P. angustifolius* (B. R. 1122; L. B. C. 420), *P. atropurpureus* (L. B. C. 1429), *P. pulchellus* (B. R. 1138; L. B. C. 1438), *Chelone atropurpurea* (S. B. F. G. 235), *C. campanuloides* (A. B. R. 40), *C. rosea* (S. B. F. G. 230).

P. centranthifolius (Centranthus-leaved). *fl.*, corolla bright carmine, 1in. long, the lobes equal, except that the two upper ones are united higher, and equally spreading, scarcely longer than the breadth of the throat; sterile filament filiform, naked. June. *l.*, lower ones oblong; upper ones obovate or lanceolate, amplexicaul. *h.* 2ft. 1858. (B. M. 5142.) SYN. *Chelone centranthifolia* (B. R. 1737).

P. Cobæa (Cobæa-flowered). *fl.* varying from dull reddish-purple to whitish; corolla 2in. long, inflated and broadly campanulate above the calyx, glabrous within; panicle few-flowered, viscous-pubescent. August. *l.* ovate or oblong, argutely serrated or denticulated. *h.* 1ft. (rarely 2ft.). 1835. Plant viscous-puberulous, half-hardy perennial. (B. M. 3465.)

P. confertus (crowded-flowered).* *fl.* sulphur-colour, densely glomerate; sepals sometimes terminating in a long point; corolla narrow, nearly ½in. long; cymes often sessile. July. *l.* highly glabrous, usually entire; cauline ones lanceolate or oblong. *h.* 6in. to 18in. 1827. Plant very glabrous, strict. (B. R. 1260.)

P. c. cæruleo-purpureus (bluish-purple). *fl.* with a bluish-purple corolla and very variable sepals. (B. M. 2954 and L. B. C. 1616, under name of *P. procerus*—an inappropriate one, as the plant is ordinarily one of the lowest of the genus.)

P. cordifolius (cordate-leaved).* *fl.* bright scarlet, profusely produced; corolla tube about 1in., and lips ½in. long, tubular-cylindrical; sterile filament densely bearded. June. *l.* ovate or sub-cordate, usually denticulate or sparsely dentate, scabrid, with the veins impressed above. 1848. Plant sarmentose, and also climbing like a Lonicera, pruinose-puberulous or glabrous. Half-hardy sub-shrub. (B. M. 4497.)

P. crassifolius (thick-leaved). A synonym of *P. Menziesii Douglasii.*

P. deustus (blasted).* *fl.* yellowish, crowded; corolla ½in. long, the tube slightly enlarged; sterile filament glabrous; cymes pedunculate. July. *l.* usually laciniately or pectinately serrate; cauline ones oblong or lanceolate. *h.* 1ft. 1827. Plant glabrous. (B. R. 1318.)

P. diffusus (diffuse).* *fl.* purple, showy, in dense cymelets; corolla less than 1in. long; sterile filament bearded at apex; panicle often leafy. September. *l.* ovate or ovate-lanceolate; upper ones somewhat cordate-amplexicaul, thick, serrated. Stem ascendent. *h.* 1½ft. 1826. Plant puberulous. See Fig. 77. (B. M. 3645; B. R. 1132.) "*P. argutus* (P. M. B. vi. 271) appears to be a form of this, connecting with *P. Richardsonii*" (Asa Gray).

P. Eatoni (Eaton's).* *fl.* rich crimson-scarlet, disposed in terminal panicles; corolla widening towards the mouth, the lobes nearly equal. *l.*, lower ones broadly ovate. *h.* 1½ft. California, 1883. One of the best plants of the genus.

P. erianthera (woolly-anthered). A synonym of *P. glaber.*

P. glaber (smooth).* *fl.* purple, violet, or blue, thyrsoid-paniculate, showy; corolla ventricose-ampliate; sterile filament shortly hairy towards the apex. August. *l.* entire, often glaucescent; cauline ones sessile, lanceolate or ovate-lanceolate. *h.* 6in. to 12in. 1811. Plant highly glabrous. (B. M. 1672.) SYNS. *P. erianthera, P. Gordoni* (B. M. 4319).

P. g. cyananthus (Cyananthus-like). *fl.* in a large, dense thyrse. *l.* broad, cordate-ovate; upper cauline ones acuminate. *h.* 3ft. (B. M. 4464, under name of *P. cyananthus*).

P. glabrus stenosepalus (glabrous, narrow-sepaled). A synonym of *P. glaucus stenosepalus.*

P. glandulosus (glandular). *fl.* violet or lilac, showy, large; corolla swollen above, with the limb shortly bilabiate; inflorescence paniculate. June. *l.* ample, slightly serrated; upper ones cordate-amplexicaul. *h.* 1½ft. 1827. Plant viscous-pubescent. (B. M. 3688; B. R. 1262.) SYN. *P. staticifolius* (B. R. 1770).

P. glaucus (glaucous). *fl.* dull lilac or violet-purple, disposed in a somewhat compact thyrse; corolla less than 1in. long, enlarged above the base, with an ample throat. July. *l.* more or less glaucous; radical ones sub-ovate; cauline ones lanceolate or ovate-lanceolate, dilated at base. *h.* 9in. to 12in. 1827. (B. R. 1286.)

P. g. stenosepalus (narrow-sepaled). *fl.*, sepals lanceolate, long-acuminate; thyrse short, compact. SYN. *P. glabrus stenosepalus.*

P. Gordoni (Gordon's). A synonym of *P. glaber.*

P. gracilis (slender).* *fl.* lilac-purple, or sometimes whitish, ¾in. to 1in. long, tubular-funnel-shaped or almost cylindric; peduncles

Pentstemon—*continued.*

two to several-flowered. August. *l.*, cauline ones mostly linear-lanceolate, 1in. to 3in. long, sometimes serrated; radical ones spathulate or oblong. Stems slender, 1ft. or less high. 1824. (B. M. 2945; L. B. C. 1541.)

P. grandiflorus (large-flowered). *fl.* purple, very showy; corolla 1½in. long; sterile filament hooked, shortly dilated and very slightly bearded at apex; cymelets two to five-flowered; pedicels shortened. July. *l.* all distinct; cauline ones, especially the upper ones, round, amplexicaul, or connate-perfoliate. *h.* 3ft. 1811.

FIG. 78. UPPER PORTION OF PLANT OF PENTSTEMON HARTWEGI.

P. Hartwegi (Hartweg's).* *fl.* scarlet or blood-colour; corolla shortly dilated upwards, 2in. long, tubular-funnel-shaped, with spreading lobes; peduncles two or three-flowered, elongated. June. *l.* lanceolate, or the upper ones dilated at base, amplexicaul, ovate-lanceolate, acuminate, entire. *h.* 2ft. 1825. See Fig. 78. (B. M. 3661 and B. R. 1838, 3, under name of *P. gentianoides.*)

P. heterophyllus (variable-leaved).* *fl.* pink or rose-purple; corolla more than 1in. long, ventricose-funnel-shaped above, the limb shortly bilabiate; racemes twiggy; peduncles one, rarely two, flowered. July. *l.* entire; cauline ones linear-lanceolate or narrow-linear, attenuated at base. *h.* 1½ft. 1834. Plant highly glabrous or pruinose-puberulous, scarcely glaucous. (B. M. 3853; B. R. 1899.)

P. hirsutus (hairy). A synonym of *P. pubescens.*

P. humilis (dwarf). This species is closely related to *P. gracilis.* It differs, however, in the corolla being saturated with blue, and shorter, thyrse more upright; leaves paler; and habit dwarfer (3in. to 9in. high). 1874. (B. M. 6122.)

P. labrosus (large-lipped). *fl.* 1¼in. long, horizontal or ascending; corolla scarlet, with lobes half as long as the narrow tube; panicle of long, slender, loose-flowered racemes. August. *l.*, lower ones 4in. to 5in. long by ¼in. to ½in. broad, narrowly oblanceolate, narrowed into the petiole, quite entire, obtuse or sub-acute; upper leaves shorter, quite linear. Stem 3ft. to 4ft. high, red-purple below. 1884. (B. M. 6738.)

P. lævigatus (polished). *fl.*, corolla white, commonly tinged with purple, about 1in. long, abruptly campanulate-inflated above the tube; sterile filament thinly bearded above. Summer. *l.* firm, and somewhat glossy; cauline ones ovate or oblong-lanceolate, with subcordate, clasping base. *h.* 2ft. to 4ft. (B. M. 1425.)

Pentstemon—*continued.*

P. l. Digitalis (Foxglove-like). *fl.* white; corolla upwards of 1in. long, the tube narrowed from above, ampliate-campanulate; sterile filament sparsely bearded; thyrse naked, loose, many-flowered. August. *l.* scarcely serrulate; cauline ones 3in. to 6in. long, lanceolate, or the upper ones ovate-lanceolate, perceptibly attenuated. *h.* 1ft. 1824. (B. M. 2587.) SYN. *Chelone Digitalis* (S. B. F. G. 120).

P. Mackayanus (Mackay's). A synonym of *P. pubescens.*

P. Menziesii Douglasii (Menzies', Douglas' var).* *fl.* lilac-purple, pink-red at base; corolla shortly bilabiate, with an enlarged throat; inflorescence racemose. June. *l.* thickly coriaceous, rather small, entire, usually obovate-lanceolate. *h.* 1ft. (B. R. xxiv. 16, under name of *P. crassifolius.*) The typical plant, *Menziesii*, has not been introduced.

P. M. Scouleri (Scouler's). *fl.* purple. May. *l.* obovate-lanceolate or oblanceolate, mostly argutely serrated. *h.* 3ft. 1827. (B. R. 1277, under name of *P. Scouleri.*)

P. Murrayanus (Murray's).* *fl.* red, showy, on slender pedicels; corolla 1½in. long, enlarged from below; sterile filament highly glabrous, hooked, and shortly dilated at apex. August. *l.*, upper or cauline ones connate, orbicular. *h.* 2ft. to 3ft. 1835. (B. M. 3472.)

P. ovatus (ovate). *fl.* purplish-blue, somewhat clustered; corolla tube scarcely enlarged; sterile filament bearded at apex. July. *l.* ovate or ovate-lanceolate, often argutely toothed; upper cauline ones sub-cordate at base and amplexicaul. *h.* 4ft. 1826. Plant puberulous. (B. M. 2903; S. B. F. G. ser. ii. 211.)

P. Palmeri (Palmer's). *fl.* pale purple, on slender pedicels; corolla broadly ampliate-campanulate above the calyx; panicle naked, raceme-like, twiggy, loose-flowered; peduncles two or three-flowered. Summer. *l.* lanceolate-ligulate, argutely denticulate, and, as well as the stem, glaucescent; upper ones semi-amplexicaul; lower ones spathulate, attenuated into the petioles. *h.* 1½ft. 1873. (B. M. 6064.)

P. pubescens (downy).* *fl.* dull violet or purple, or partly whitish, disposed in a loose-flowered thyrse; corolla enlarged above, and shortly obcompressed; sterile filament long, and densely bearded. August. *l.*, cauline ones linear- or ovate-lanceolate, the uppermost ones reduced to small bracts. *h.* 1ft. to 3ft. 1834. Plant viscous-pubescent or almost glabrous. SYNS. *P. hirsutus* (B. M. 1424), *P. Mackayanus.*

P. pulchellus (pretty). A synonym of *P. campanulatus.*

P. Richardsonii (Richardson's). *fl.* violet, disposed in a loose panicle; corolla 1in. long; sterile filament slightly bearded at apex. July. *l.* ovate-lanceolate or narrow-lanceolate, incised or laciniate-pinnatifid. Stem usually branched; branches spreading. *h.* 1½ft. 1825. Plant almost glabrous. (B. M. 3391; B. R. 1121; L. B. C. 1641.)

P. spectabilis (remarkable). *fl.* bluish-purple; corolla 1in. long, the tube inflated above, the lobes very broad and much spreading; sterile filament glabrous; cymelets three to nine-flowered, pedunculate; panicle loose, elongated. June. *l.* thick, ovate-lanceolate, coriaceous; upper cauline ones amplexicaul, connate. *h.* 2ft. 1816. Plant highly glabrous. (B. M. 5260.)

P. staticifolius (Statice-leaved). A synonym of *P. glandulosus.*

P. Torreyi (Torrey's). A synonym of *P. barbatus Torreyi.*

P. triphyllus (three-leaved). *fl.* violet, disposed in a loose, leafy panicle; corolla ½in. long, slightly enlarged above; sterile filament densely bearded. July. *l.* lanceolate or linear, few-toothed or pinnatifid; lower ones ternate or quaternate, upper ones sometimes opposite. *h.* 1½ft. 1827. Plant almost glabrous, branched. (B. R. 1245.)

P. venustus (charming).* *fl.* purple; corolla upwards of 1in. long, dilated upwards from a narrow tube; sterile filament densely bearded at apex, the lobes ciliated; panicle thyrsoid, rather loose. June. *l.* ovate, or ovate-lanceolate; upper ones sub-cordate, amplexicaul, thickly serrated. Stem ascendent. *h.* 2ft. 1827. Plant puberulous. (B. R. 1309.)

P. Wrightii (Wright's). *fl.* rosy-red; corolla less than 1in. long, dilated-ventricose above, with an ample limb of round, much-spreading lobes; sterile filament long, and densely bearded; cymelets or panicles loose, twiggy, few-flowered. June. *l.*, lower ones oblong; upper ones sub-obovate or lanceolate, amplexicaul *h.* 2ft. 1850. (B. M. 4601.)

Varieties. The seedling or garden varieties of *Pentstemon* have now attained a high degree of excellence, and, as they are so readily raised, other additions are annually made, which represent improvement in form, size, or colour-markings, the result of selection, which the florist or specialist is rigidly prosecuting. The garden varieties are principally the offspring of *P. Cobæa* and *P. Hartwegi*, though other species may also have had something to do with the origin. Subjoined is a selection from the best varieties in cultivation. Many of the old ones are now of sufficient merit to hold their own against new comers.

Pentstemon—*continued.*

AGNES LAING, dark rose, throat fine white; splendid form. ALEXANDER TOD, rosy-pink, throat blotched, dense panicle; extra fine. AMELIA, rosy-salmon, mouth and throat dark blotched, large flowers. ARCHIBALD FORBES, magenta, throat white, slightly pencilled, large flower and panicle. BLACK KNIGHT, maroon, throat shaded white; good form; a fine variety. BRIDESMAID, French white, tipped pink; an acquisition. CANDIDATE, bright carmine-scarlet, throat white, lobes belted rose; extra fine. DECISION, magenta-crimson, throat white, pencilled crimson; large and fine. DIANE, dark violet-rose, throat veined and spotted purple. ECCENTRIC, crimson, throat white, blotched and pencilled. E. J. LOWE, vivid scarlet, throat finely pencilled. FLEURON, deep red, tinted crimson and maroon, throat pure white, heavily pencilled; distinct. GEORGE M'ROBERT, puce-purple, throat blotched, close panicle; distinct and fine. H. CANNELL, bright rose, throat pure white, heavily pencilled crimson-maroon; large flowers and panicle. HELEN WOOD, purplish-crimson, throat white, slightly pencilled. JAMES BEGG, carmine-magenta, throat white; large open flower; very showy. JAMES THOMSON, bright vermilion, throat white; very fine. JESSIE FORBES, reddish-purple, throat pure white, heavily pencilled crimson. KING OF PENTSTEMONS, violet-purple, throat white, pencilled; flowers large, and of fine form. LADY MARGARET, maroon, throat white, heavily pencilled, fine panicle. MISS F. HOPE, pure white, slightly suffused pink; one of the best of its class. MISS HAMPTON, mulberry, throat blotched, pure white spot; fine. MISS WATSON, maroon-purple, throat chocolate, pencilled and spotted white; very fine. MRS. ALEXANDER M'KINNON, mauve-crimson, throat white, finely pencilled crimson. MRS. GREEN, rose, throat pure white; extra. MRS. MANN THOMSON, blue, throat pure white; large, and very showy. MRS. NIXON, dark mauve-purple, throat pure white; large flower. MRS. STYLES, tube dark lilac, mouth claret; large flower. PILRIG PARK, rosy-purple, throat blotched, fine panicle; extra. P. KLEIN, bright purplish-pink, throat pure white; flowers large and fine. PROGRÈS, rosy-crimson, throat pure white, pencilled; extra. ROBERT DODDS, reddish-crimson, throat pure white; very fine. ROBERT WARD, scarlet, throat blotched; extra. THE CLOWN, rosy-red, throat white, beautifully marbled crimson; fine. THE FAVOURITE, carmine-rose, throat pure white, pencilled deep red; large flowers and panicle. WILLIAM MILLER, cherry-crimson, throat white, heavily blotched chocolate.

PENTSTERIA. A synonym of **Torenia** (which *see*).

PENTZIA (named by Thunberg, in honour of his pupil, Charles John Pentz). ORD. *Compositæ*. A genus comprising ten species of small, hoary, pubescent, glandular, or glabrous, greenhouse shrubs, indigenous to South Africa. Flower-heads yellow, homogamous, corymbose at the tips of the branches, or solitary on long peduncles; achenes glabrous, often glandular; involucre ovoid or hemispherical; receptacle flat or convex. Leaves alternate, often small, cuneate, toothed, incised or dissected. For culture of *P. flabelliformis*, probably the only species introduced, *see* **Tanacetum.**

P. flabelliformis (fan-leaved). *fl.-heads* yellow, disposed in a simple corymb. May to August. *l.* deltoid, serrated at apex, of a pale hue. *h.* 2½ft. 1774. (B. M. 212, under name of *Tanacetum flabelliforme*.)

PEONY. *See* **Pæonia.**

PEPERIDIUM. A synonym of **Renealmia** (which *see*).

PEPEROMIA (from *Peperi*, Pepper, and *omoios*, similar; in allusion to its close relation to that plant). Pepper Elder. Including *Micropiper*. ORD. *Piperaceæ*. A vast genus (nearly 400 species have been described) of mostly stove, annual or perennial, herbaceous plants, usually fleshy and creeping, broadly dispersed over the warmer regions of the globe, but mostly American. Flowers minute, variously disposed, scattered and crowded; perianth wanting; stamens two. Leaves alternate, opposite, or verticillate, entire, slightly fleshy, succulent, or slender and membranous, often pellucid-dotted; stipules none. Peperomias are very interesting, small-growing, ornamental-leaved plants, suitable for culture in small pots; some of the species that are of trailing habit are also well adapted for hanging baskets. Although, properly, the species described below are stove subjects, they may be placed in vases for the temporary decoration of the sitting-room, as their stout, succulent leaves enable them to successfully withstand the change. They should be grown in good, fibrous peat and

Peperomia—*continued.*

loam, with the addition of some silver sand. Shade from sunshine throughout the summer is requisite; but an abundance of light should be allowed in dull weather, and shading dispensed with altogether in winter. Propagated by cuttings, and by seeds when obtainable. Cuttings consisting of short pieces of the shoots, or single joints with a leaf attached, root readily in spring, if inserted in pans of sandy peat; these should be plunged in a propagating house, but not in a frame: they are liable to damp off if confined. Keep shaded, and only a little moist, until roots are formed. Even when established, Peperomias do not require so much water as many stove subjects. The species described below are grown for the beauty of their foliage. They are perennials except where otherwise specified.

P. arifolia (Arum-leaved). *l.* variegated green and grey, ovate, acuminate. Brazil, 1864.

P. a. argyreia (silver-striped). A synonym of *P. Saundersii*.

P. Botteri (Botteri's). *fl.* borne in slender, cylindrical catkins. *l.* ovate, pubescent, growing in whorls of three. Stems slender, sparingly branched. Mexico, 1869. (Ref. B. 211.)

P. brevipes (short-stalked). *l.* beautifully variegated with brown and light green, round, on long, thread-like stems. 1879. A pretty and slender-growing basket-plant. SYN. *P. prostrata* (of gardens). (G. C. n. s., xi. 717.)

P. clusiæfolia (Clusia-leaved).* *fl.*, peduncles terminal, smooth, red, bearing one or two long, cylindrical spikes. May. *l.* 4in. to 6in. long, between coriaceous and fleshy, shortly petiolate, obovate, tapering downwards and somewhat auricled at the very base, concave and channelled above, the margins dark red and recurved, the extremity often emarginate. Stems much-branched, red, wrinkled, decumbent at base. *h.* 1ft. West Indies, 1817. Evergreen. (B. M. 2943.)

P. eburnea (ivory-petioled). *l.* of a brilliant green, veined with emerald-green, borne on finely tomentose petioles of an ivory-white. *h.* 12in. to 15in. New Grenada, 1871. A beautiful perennial, of close, tufted habit.

P. incana (hoary). *fl.*, catkins terminal, elongated, thrice as long as the leaves, dense-flowered. February. *l.* petiolate, orbicular, slightly cordate, or ovate, thick, fleshy, opaque, white-tomentose on both sides, shining above. *h.* 1ft. Brazil, 1815. A white-tomentose, fleshy sub-shrub. (H. E. F. 66.)

P. maculosa (spotted).* *l.* very fleshy, ovate-lanceolate, bright shining green; petioles beautifully spotted with purple. Tropical America, &c.

FIG. 79. PEPEROMIA MARMORATA, showing Habit and detached Inflorescence.

P. marmorata (marbled).* *fl.* in an erect, tail-like catkin. *l.* of a rich bright green, beautifully variegated with white, the colours somewhat marbled or reticulated; thick, fleshy, somewhat ovate, acuminated. South Brazil, 1866. An elegant species. See Fig. 79. (B. M. 5568.)

P. microphylla (small-leaved). *fl.* in short, terminal spikes. *l.* small, obovate-oblong, usually in whorls of four. Stems slender, succulent, much-branched. Mexico, 1869. Trailer. (Ref. B. 41.)

P. nummulariæfolia (Moneywort-leaved).* *fl.* in terminal spikes. *l.* alternate, roundish, stalked, similar to those of

Peperomia—*continued.*

Nummularia. Stems thread-like, fleshy, much branched, creeping to an indefinite length. Jamaica, &c., 1866. This species is eminently adapted for covering the sides of hanging baskets. (Ref. B. 13.)

FIG. 80. PEPEROMIA SAUNDERSII.

P. obliqua (oblique). *fl.* in dense, axillary and terminal catkins. *l.* shortly petiolate, oblique, oblong-ovate, attenuated at apex, acute, glabrous, fleshy. Peru. (B. M. 1882, as *Piper acuminatum.*)

P. peltæformis (shield-like). *l.* dark green, marked with a few longitudinal bands of grey, thick, ovate, poised on a somewhat slender stalk, peltately attached. Brazil, 1864.

Peperomia—*continued.*

P. Saundersii (Saunders').* *l.* orbicular or ovate, about 5in. long, thick and fleshy, the colour along the veins bright green, the interstices being a metallic white. *h.* 8in. to 10in. Brazil, 1866. A handsome plant, of very compact habit. SYNS. *P. arifolia argyreia* (B. H. 1867, 2; B. M. 5634) and *P. Verschaffeltii* (I. H. 598). See Fig. 80.

P. velutina (velvety). *l.* dark green, longitudinally ribbed and banded with grey. Stems red, fleshy. Ecuador, 1872. (I. H. n. s. 89.)

P. Verschaffeltii (Verschaffelt's). A synonym of *P. Saundersii.*

PEPINIA. Included under **Pitcairnia** (which *see*).

PEPLIS (an old Greek name given by Dioscorides to *Euphorbia Peplis*, and by others to *Portulaca*). ORD. *Lythrariew.* A genus comprising three species of small, hardy, annual herbs, natives of Europe, North Africa, and temperate Asia. Flowers axillary, sessile, solitary, minute, minutely bibracteolate; calyx lobes and petals six, rarely five. Leaves alternate or opposite, obovate or linear-oblong, entire. The species are of little or no horticultural value. *P. Portula* is a common weed, found in moist places in Britain.

PEPO. "A one-celled, many-seeded, inferior fruit, with parietal placentæ and a pulpy interior, as a Gourd" (Lindley).

PEPPER. *See* **Piper.** The name is also applied to several other plants.

PEPPER, BIRD. *See* **Capsicum baccatum.**

PEPPER ELDER. A name applied to *Peperomia* and various species of *Piper.*

PEPPERIDGE. A common name for *Nyssa multiflora.*

PEPPERMINT. *See* **Mint.**

PEPPERMINT-TREE. A common name for several species of *Eucalyptus.*

PEPPER SAXIFRAGE. *See* **Silaus pratensis.**

FIG. 81. BRANCH OF PERESKIA GRANDIFOLIA (page 76).

P. prostrata (prostrate). A garden name of *P. brevipes.*

P. pubifolia (downy-leaved). *l.* marked with a central grey bar, small, ovate, fleshy in texture. 1865. A pretty, perennial creeper, suitable for basket culture.

P. resedæflora (Reseda-flowered). *fl.* white, fragrant, collected into numerous divaricate, filiform, clavate, and sulcately nodose catkins, which form erect, pyramidal, loose, terminal panicles. *l.* dark green, entire, cordate-orbicular; radical ones rosulate and long-stalked; cauline ones irregularly whorled. New Grenada, 1870. (B. M. 6619; I. H. ser. iii. 26.)

PEPPERWORT. *See* **Lepidium.**

PERALTEA. Included under *Brongniartia.*

PERAMIUM. A synonym of *Goodyera.*

PERANEMA. Included under **Sphæropteris** (which *see*).

PERDICIUM (in part). A synonym of **Trixis** (which *see*).

PEREIRIA. A synonym of **Coscinium** (which *see*).

PERENNIALS. Plants which last for several years are termed Perennials. The term is in most general use in referring to hardy border plants, where it is necessary to distinguish between those which are perennial, and others that are only of annual or biennial duration.

PERESKIA (named after Nicholas F. Peiresk, senator of Aix, in Provence, who collected a considerable library and herbarium). Barbados Gooseberry. SYN. *Peirescia.* ORD. *Cacteæ.* A genus comprising about thirteen species of stove, woody shrubs or trees, with terete, leafy branches; they are natives of tropical America and the West Indies. Flowers solitary or paniculate, terminal or lateral, sessile or pedunculate; petals broad, expanded in a rose-like manner; calyx tube equal with the ovary, and divided into leafy segments; stamens numerous, free, shorter than the petals; the thread-like style bearing a many-rayed stigma. Fruit pear or egg-shaped, with a broad scar at the top, surrounded by the leafy segments of the calyx. Leaves fleshy, sessile or stalked, flat or semi-cylindrical, veined, pulvilligerous in the axils, the pulvillæ armed. Pereskias are chiefly of use for affording stocks on which to graft Epiphyllums and other Cacti. *P. aculeata* is most extensively used, while *P. Bleo* is more vigorous and better adapted for tall stocks. The latter is rather a fine decorative stove plant when in flower. Cuttings strike readily in heat; they should be inserted in very sandy soil, and kept rather dry. The plants succeed in sandy loam, to which a little brick rubbish should be added.

P. aculeata (prickly).* American or Barbados Gooseberry. *fl.* white, rather panicled. October. *fr.* globose, with narrow sepals, edible. *l.* elliptic. Prickles one or two, recurved at the downy base of the petiole. Stem armed with fascicled, straight spines. *h.* 5ft. to 7ft. West Indies, 1696. Shrub. (B. R. 1928.)

P. Bleo (Bleo).* *fl.* pale red (the stamens also red, but white at the base), two to four together at the tops of the branches, each on a short peduncle. October to January. *l.* oblong, acuminated. Prickles axillary, five or six in a fascicle. *h.* 8ft. to 10ft. New Grenada, 1827. Shrub. (B. M. 3478; B. R. 1473.)

P. grandiflora (large-flowered). A synonym of *P. grandifolia.*

P. grandifolia (large-leaved).* *fl.* white, somewhat panicled, solitary. August. *l.* oblong-lanceolate, smooth above, beset with rough dots beneath. Stem very spiny; larger spines blackish, 2in. long. *h.* 6ft. Brazil, 1818. Shrub. SYN. *P. grandiflora.* See Fig. 81, page 75.

P. Pititache (Pititache). *fl.* white. September. *l.* fleshy, lanceolate-ovate. Trunk woody, erect, very spiny; branches sub-horizontally divergent; areolæ approximate, tomentose; prickles three to six, unequal, rigid. *h.* 3ft. Mexico, 1838. Shrub.

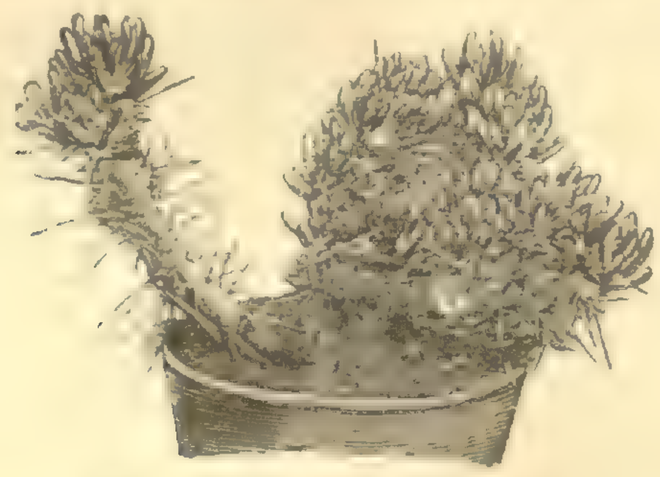


FIG. 82. PERESKIA PŒPPIGII.

P. Pœppigii (Pœppig's). *l.* cylindrical, green. Stem low, upright, thin, cylindrical, irregular; spines white, strong, generally in threes, the central one being longest. Chili. See Fig. 82.

P. portulacæfolia (Portulaca-leaved). *fl.* purple, solitary, terminal; petals roundish. *fr.* umbilicate, globose, retuse, greenish, with white flesh, and numerous black seeds. *l.* obovate-cuneate. Prickles solitary under the leaves, but fasciculate on the stems, blackish. *h.* 20ft. to 30ft. West Indies, 1820. Tree.

PEREZIA (called after Lazarus Perez, an apothecary at Toledo, who wrote, in 1575, a history of drugs). Including *Dumerilia* (of Lessing) and *Homoianthus.* SYN. *Clarionea.* ORD. *Compositæ.* A genus comprising about forty-six species of greenhouse, half-hardy, or hardy herbs, sometimes stemless or tufted, sometimes erect and branched; they are natives of extra-tropical South America or the Andes, Central America, Mexico, and California, and a few are found in Brazil. Flower-heads purple, pink, blue, or white, homogamous, rather large, on a one-headed, leafless scape, or sometimes mediocre, or smaller, and clustered or loosely paniculate at the apices of the stems; involucre ovoid, campanulate or turbinate; receptacle flat, naked or pilose. Leaves radical or alternate, entire, toothed, pinnatifid or dissected; lobes toothed, sometimes spiny-ciliate. Few of the species are known to cultivation. For culture, *see* **Aster.**

P. viscosa (clammy). *fl.-heads* purple; pappus reddish; receptacle piloso-fimbrilliferous; involucral scales biseriate, entire, sub-equal, mucronulate. June. *l.*, radical ones oblong-cuneate, obtuse, sinuate, acute, somewhat glandular; cauline ones sessile. Stem erect, almost naked or glandular. *h.* 1½ft. Chili, 1862. Hardy. (B. M. 5401, under name of *Homoianthus viscosus.*)

PERFECT. A term more particularly applied to hermaphrodite flowers.

PERFOLIATE. When the stem appears to pass through the substance of a leaf, owing to the union of its amplexicaul lobes.

FIG. 83. DOUBLE PERIANTH, as seen in Flower of *Abutilon insigne.*

PERGAMENEOUS. Resembling parchment in texture.

PERGULARIA (from *pergula* an arbour; referring to the twining character of the plants). ORD. *Asclepiadeæ.* A genus comprising about ten species of stove, evergreen, glabrous climbers, inhabiting tropical Asia and Africa and Southern Africa. Flowers golden-yellow or greenish; calyx five-partite; corolla salver-shaped, with an ovoid or oblong tube; staminal corona five-leaved. Leaves opposite, membranous. For culture, *see* **Stephanotis.**

P. minor (smaller). *fl.* orange-coloured or yellow, very fragrant; umbels shorter than the leaves. May to August. *l.* orbicular or ovate-cordate, acuminate, downy while young. India, China, &c., 1790. (A. B. R. 184; B. M. 755.)

P. odoratissima (sweetest-scented).* West Coast Creeper. *fl.* greenish-yellow, exceedingly fragrant; umbels shorter than the leaves; corolla woolly inside. June. *l.* cordate, acuminated,

Pergularia—*continued.*

soft, downy, 4in. long. China, &c., 1784. (A. B. R. 185; B. R. 412.)

P. sanguinolenta (bloody-juiced). *fl.* greenish-yellow; cymes many-flowered, shorter than the leaves. July. *l.* ovate-lanceolate, quite glabrous. Sierra Leone, 1822. Plant trailing, full of blood-coloured juice. (B. M. 2532.)

PERI. Greek for around; *e.g.*, as in Perianth.

PERIANTH. The outer, or accessory, organs in the flower, *i.e.*, the sepals and petals, which protect the essential organs of reproduction, or the *true* flower, in

FIG. 84. PETALOID PERIANTH, as seen in *Lilium concolor pulchellum.*

botanical language, *i.e.*, the stamens and pistil. In most flowers, the perianth is *double*, consisting of an outer circle of green sepals, and an inner circle of coloured

FIG. 85. SINGLE PERIANTH, as seen in *Anemone sylvestris.*

petals (as in *Abutilon*, Fig. 83). In the *Liliaceæ*, and other plants, the perianth, though double, consists of parts very much alike, and all petaloid (*Lilium concolor*, Fig.

Perianth—*continued.*

84); while in others—*e.g.*, *Juncus*, &c.—all the parts are sepaloid. Often one of the circles is wanting, and the missing circle is usually the petals, though (as in *Anemone*, Fig. 85) those present may appear petaloid. Often such *single* perianths are sepaloid (*Mercurialis*). In a good many plants (Willows, *Arum*), there is no trace of perianth. In many plants, the bracts are modified to simulate part of a perianth (sepaloid bracts of *Dianthus*, and petaloid bracts of *Cornus suecica*).

PERIBŒA. Included under **Hyacinthus** (which *see*).

PERICALLIS. Included under **Senecio** (which *see*).

PERICALYMNA. Included under *Leptospermum.*

PERICARP. The rind or shell of all fruits.

PERICLADIUM. The sheathing base of a leaf when it expands and surrounds the supporting branch; the dilated, sheathing base of some petioles.

PERICLINIUM. The involucre of the flower-heads in *Compositæ.*

PERICYCLA. A synonym of **Licuala** (which *see*).

PERIDERM, PERIDERMIS. The outer cellular layer of bark, below the epidermis.

PERIDERMIUM from *peri*, around, and *derma*, skin). A group of Fungi, including only a few forms, parasitic on *Coniferæ.* Those of most importance are *P. elatinum* (also called *Æcidium elatinum*), which gives rise to swellings on the branches of the Silver Fir (*Abies pectinata*), and *P. Pini*, with its variety *P. acicolum*, on the Scotch Fir (*Pinus sylvestris*) and the Austrian Fir (*P. austriaca*), in pleasure grounds, as well as in forests. The genus belongs to the group of "red rusts," and the Fungi in it form a mycelium in the tissues of the leaves and branches of the host-plants. On the surface of the diseased parts there appear, after a time, cylindrical, laterally flattened, or conical outgrowths, called peridia, $\frac{1}{16}$in. to $\frac{1}{8}$in. high, and $\frac{1}{32}$in. to $\frac{1}{4}$in. broad; the larger forms being on the branches, and the smaller on the needles. These outgrowths are formed of a thin layer of cells, which tears irregularly at the tip, and sets free numerous small, round, orange-coloured spores, to reproduce the plant.

P. (*Æcidium*) *elatinum* is not very frequent; but where it is present the tree sometimes bears a large number of swellings on the branches, often near the base of one or more small branches, or supports what are known as "witch-besoms" on the larger branches. Both kinds of growth are the work of the Fungus; and the difference is due chiefly to age. The swellings vary from the size of a Hazel nut to that of a closed fist; the bark is the part most enlarged. The mycelium grows in the bark and the pith-rays and pith, and often causes separation of the bark from the wood, and the death of the wood in patches. In most cases, it does not kill the branch entirely; but the mycelium is perennial, and the growth on the branch continues to increase year after year. When branches grow from the surface, they often branch very freely, but remain stunted; and this is repeated year by year, the "witch-besoms" being thus formed. The leaves on the diseased shoots are short and stunted, and are usually covered with peridia. Though not usually, or only very slowly, dangerous to the life of the tree, the growths are very objectionable, as they greatly spoil its appearance. The only effectual remedy is cutting off the diseased branches as soon as the swellings appear, in order to prevent the disease from spreading to other trees.

P. Pini grows in branches of Firs, and almost always

Peridermium—*continued.*

on trees under twenty years old. The peridia are about $\frac{1}{16}$in. or $\frac{1}{4}$in. long, and $\frac{1}{8}$in. high, and are usually flattened on the sides. They are generally crowded (see Figs. 86 and 87), and may occur on the same branch for two or more years in succession; but they ultimately kill the branches. The Fungus is also found on the needles, in a form called *P. acicolum*. The peridia are much smaller in this form, and are more cylindrical, and stand in a row along the needles; but the latter are not so severely injured as the branches. The growth of the mycelium in

FIG. 86. STEM OF YOUNG PINE ATTACKED BY PERIDERMIUM PINI.

the branches causes the conversion of the starch and other food stores in the cells into turpentine and resins, which soak into all the tissues, and at last often appear on the surface of the branches. Investigations by Wolff and others have, of late years, led to the belief that this Fungus is only a stage in the life-cycle of another, named *Coleosporium Senecionis*, which has long been known as a widespread and abundant parasite on the leaves and stems of Groundsels (*Senecio vulgaris* and *S. viscosus*) and of Ragwort (*S. Jacobæa*). The *Coleosporium* forms yellow or orange spots, crowded into

FIG. 87. BARK OF PINUS SYLVESTRIS INVADED BY PERIDERMIUM PINI—*a*, *a*, Young Peridia; *b*, Peridium opened.

irregular patches, or in concentric rings, or scattered over the leaves. These spots are composed of masses of small, orange-yellow spores, covered with fine warts, and nearly round, or cylindrical or clavate in form. Experiments in growing the Fir-parasite from these spores so often fail, that further evidence on their connection is desirable. Almost the only available remedy is to cut off and burn all parts of the trees that show the disease, and to keep the neighbourhood of the trees as clear as possible of species of *Senecio*.

PERIGONE. The same as **Perianth** (which *see*).

PERIGYNOUS. Petals are said to be Perigynous when the disk bearing them is quite free from the ovary, but is more or less combined with the base of the calyx tube.

PERILLA (said to be the Indian name). SYN. *Dentidia*. ORD. *Labiatæ*. A genus consisting of only two or three species of half-hardy, annual herbs, natives of the mountains of India and China. Flowers small, pedicellate; calyx campanulate, five-fid, nodding after florescence, and bilabiate; corolla tube included, limb shortly five-fid; whorls two-flowered, secund, disposed in axillary or paniculate racemes; bracts short, or rarely exceeding the calyx. Leaves usually violet or greenish. The plants thrive in any light, loamy soil, and may be increased by seeds. *P. ocimoides crispa* is sometimes employed in summer bedding. It requires, practically, little attention beyond pinching out the points occasionally, because of its very dark and distinct foliage. Seeds, should be sown in pans or boxes, about the middle of March, and placed in a gentle heat. After being gradually hardened off, the seedlings may be placed in the open border about the end of May. A few well-grown examples of this plant will be found very useful in sub-tropical gardening.

P. heteromorpha (variable-formed). A synonym of *P. ocimoides*.

P. nankinensis (Nankin). A synonym of *P. ocimoides crispa*.

P. ocimoides (Ocimum-like). *fl.* white, numerous; corolla minute; racemes shorter than the leaves. July and August. *l.* broadly ovate, 2in. to 4in. long, acuminate, cuneate at base or narrowed into the rather long petioles, sub-rugose, deeply crenate-serrate. Stem erect, 1ft. to 3ft. high, thick, firm, obtusely tetragonal, sulcate. India, China, &c., 1770. SYN. *P. heteromorpha*. (B. M. 2395.)

P. o. crispa (curled).* A garden form, having dark bronzy-purple leaves, with the margins crisped and fimbriated. China. SYN. *P. nankinensis*.

PERILOMIA (from *peri*, around, and *loma*, a fringe; alluding to the membranous-winged nutlets). ORD. *Labiatæ*. A genus comprising about eight species of greenhouse or half-hardy, loosely or densely branched, sometimes sub-scandent, leafy shrubs, natives of the mountains of South America, extending from Chili or Bolivia to Mexico. Flowers scarlet; calyx campanulate, slightly gibbous at back, bilabiate, with short, entire lips; corolla frequently pubescent or villous, with an exserted, incurved tube, and a short, bilabiate limb; whorls two-flowered, secund, axillary, or the uppermost ones sub-racemose. Nutlets erect, triquetrous or compressed at back. Leaves dentate; floral ones conformed, or the uppermost ones reduced to bracts. The undermentioned species—the only one introduced—is a very pretty half-hardy evergreen shrub, thriving best in a sandy-peat soil. It may be propagated, in April, by cuttings of young shoots, inserted in sand, under a glass.

P. scutellaroides (skull-cap-like). *fl.* over $\frac{1}{2}$in. long, forming an elongated raceme, 6in. to 12in. long. August. *l.* ovate, crenated, roundly truncate at the base, $\frac{1}{2}$in. to $1\frac{1}{2}$in. long. *h.* 3ft. Peru, 1829. (B. R. 1394, under name of *P. ocimoides*.)

PERIPHANES. A synonym of **Hessea** (which *see*).

PERIPHRAGMOS. A synonym of **Cantua** (which *see*).

PERIPLOCA (from *peri*, around, and *ploke*, a twining; in reference to the intertwining habit of some species). ORD. *Asclepiadeæ*. A genus comprising twelve species of glabrous shrubs, sometimes twining and leafy, sometimes erect, rigid, and aphyllous, inhabiting Southern Europe, temperate Asia, and tropical and sub-tropical Africa. Flowers often brownish or blackish within, greenish outside, in loose cymes. Leaves opposite, glabrous. The undermentioned species is a very desirable plant for covering an arbour or wall, which it does very rapidly. Any moderately good garden soil suits it. Propagated by layers or cuttings, inserted under a glass, during summer and autumn.

Periploca—*continued.*

P. græca (Grecian).* Silk Vine. *fl.* greenish outside, brownish inside, clothed with copious, short hairs; corymbs disposed on long peduncles. July. *l.* varying from ovate to lanceolate, 3in. to 4in. long. South-eastern Europe, Orient, 1597. (B. M. 2289; B. R. 803; S. F. G. 249.)

PERISPERM. The albumen of seeds.

FIG. 88. PERISTERIA CERINA, showing Habit and detached Flowers.

PERISTERIA (from *peristera*, a dove; referring to the dove-like appearance of the column, whence the plant is called, in South America, "Flower of the Holy Spirit"). Dove Flower. SYN. *Echardia.* ORD. *Orchideæ.* A small genus (four species) of stove orchids, having fleshy pseudo-bulbs, natives of the Columbian Andes. Flowers showy, in short or elongated racemes, shortly pedicellate; sepals concave and connate at the base; petals similar, but rather smaller; lip with its lower half continuous with the column, and sagittate at the base, and its upper half articulated with the lower, undivided, and bent down over the face of the column, which is short, fleshy, and wingless; pollen masses two, furrowed, sessile on a narrow gland; scapes simple, erect, nodding, or deflexed at base. Leaves large, plicate. For culture, *see* **Acineta,** to which the present genus is closely allied.

FIG. 89. PERISTERIA ELATA.

Peristeria—*continued.*

P. Barkeri (Barker's). A synonym of *Acineta Barkeri.*

P. cerina (waxy). *fl.* yellow, produced in bunches on pendulous spikes. June. *l.* large, coriaceous, dark green. Pseudo-bulbs strong, two-leaved. *h.* 1ft. Central America, 1835. See Fig. 88. (B. R. 1953.)

FIG. 90. FLOWERS OF PERISTERIA ELATA (natural size).

P. elata (tall).* Dove, or Holy Ghost Flower. *fl.* white, with small lilac specks on the base of the lip, waxy, very sweet-scented, about 1½in. across, almost globose; spikes erect, 3ft. or more in height, and rising from the base of the pseudo-bulbs. July to September, and continuing to produce flowers for two months, when the growths are strong. *l.* lanceolate, strongly ribbed and plicate, sometimes upwards of 3ft. high and 6in. across. Pseudo-bulbs striated, green, as large as swans' eggs, bearing three to five leaves. *h.* 4ft. Panama, 1826. A very handsome, noble, and free-growing plant; the *Espiritu Santo* (Holy Ghost Flower) of the Spaniards. See Figs. 89 and 90. (B. M. 3116.)

P. guttata (spotted). *fl.* yellow and red; spikes produced close to the pseudo-bulbs, pendulous, and hanging over the edge of the pot. September, and remaining two or three weeks in perfection. *h.* 6in. South America, 1837. A curious, rather than showy, species.

P. Humboldtii fulva (Humboldt's tawny). A synonym of *Acineta Humboldtii.*

P. pendula (pendulous).* *fl.* pale yellow, spotted with red and brown; lip crested at the base of the disk, thick; scape short, few-flowered. *h.* 1ft. Demerara, 1855. (B. M. 3479.)

PERISTROPHE (from *peristrophe*, turning round; in reference to the corolla, which is twisted so as to be upside down). ORD. *Acanthaceæ.* A genus comprising about fifteen species of erect or loosely sub-twiggy herbs, inhabiting tropical and Southern Africa, Madagascar, the East Indies, China, and the Malayan Archipelago. Flowers generally purple; heads often pedicellate, loosely cymose; bracts two, sub-connate at base; calyx shorter than the bracts. Leaves entire. The species here described are stove perennials, and are those usually seen under cultivation. For culture, *see* **Justicia.**

P. lanceolaria (lance-leaved). *fl.* in terminal, much-branched panicles; corolla pale purple, with a long, slender tube, which is compressed and slightly twisted at apex; upper lip pale purple-

Peristrophe—*continued.*

white, 1in. long. Winter. *l.* 3in. to 5in. long, lanceolate or oblong-lanceolate, long-acuminate, attenuated into the petiole, glabrous on both surfaces. *h.* 2ft. to 4ft. India. (B. M. 5566.)

P. speciosa (showy).* *fl.*, corolla externally pubescent, with a very long, curved, remarkably twisted, pale purplish tube; lips two, elliptical-oblong, both of a deep, rich carmine-purple. Winter. *l.* opposite, petiolate, ovate, somewhat acuminated, the lower and larger ones sub-cordate and slightly crenate. Stem and old branches ash-colour. *h.* 4ft. India, 1826. (B. 74; B. M. 2722; L. B. C. 1915, under name of *Justicia speciosa.*)

PERISTYLIS. Included under *Habenaria.*

PERITHECIUM (from *peri*, around, and *thékion*, a receptacle; inasmuch as it surrounds the receptacle for the spores). The name given to certain bodies formed, in the processes of reproduction, in a large group of Fungi, the **Pyrenomycetes** (which *see*). The Perithecia vary a good deal in form, and in mode of grouping together; but they are always small, and are usually flask-shaped. They may be almost free from the mycelium, or may be imbedded in it, and, in the latter case, the wall is hardly distinguishable from the mass in which it lies. When free, the wall is often rather brittle, but moderately strong, and is formed of squarish or rounded cells, usually dark brown or black. The Perithecia may be scattered about singly, or crowded on specialised bodies. When mature, each usually contains several long, transparent cells of uniform width, or widened upwards (asci), and in each ascus there are generally eight spores, less often from two to six, or an indefinite number, for reproduction. These escape through a narrow neck, in which is a circular pore, or the aperture may be a long slit; or there may not be an aperture, the Perithecia bursting ultimately. Intermixed with the asci in many are numerous slender filaments, as long as the asci. They are the paraphyses, and their presence or absence is of consequence in distinguishing the genera in the group.

PERITOMA (from *peritome*, a cutting round about; referring to the base of the calyx). SYN. *Atalanta* (of Nuttall). ORD. *Capparideæ.* A small genus of hardy, North American, annual herbs, now included, by the authors of the "Genera Plantarum," under *Cleome.* Calyx four-fid, cut round at the base; stamens six. Capsules stalked. Leaves compound, generally three to five-foliolate. For culture of *P. aurea*, *see* **Cleome.**

P. aurea (golden). *fl.* yellow; petals oblong-elliptic, sub-sessile. July and August. *l.* three to five-foliolate; leaflets oblong-lanceolate, acute at both ends, entire. *h.* 1ft. 1840. The proper name of this plant is *Cleome lutea.* (B. R. xxvii. 67.)

PERIWINKLE. *See* **Vinca.**

PERNETTYA (named after A. J. Pernetty, 1716-1801, who accompanied Bougainville in his voyage, and was anthor of "A Voyage to the Falkland Islands"). ORD. *Ericaceæ.* A genus comprising about fifteen species (the number is inordinately multiplied by some authors) of hardy, or nearly hardy, rigid, very glabrous, hispid, or ciliated shrubs, some small; one is a native of the mountains of Tasmania and New Zealand, another is Brazilian, and the rest inhabit the mountains of Western America, from Tierra del Fuego to Mexico. Flowers white or rose-colour, small, nodding, solitary in the axils, or disposed in axillary or terminal racemes; calyx five-parted, not changing in the fruit, persistent; corolla urceolate or globose, shortly five-lobed, the lobes recurved; pedicels curved, bracteate and bibracteolate. Fruit a globular berry, varying considerably in colour and size, generally about the size of a pea. Leaves usually small, alternate, short-stalked, serrated, penni-nerved, coriaceous, hard, persistent. The species best known in cultivation are those described below. For culture, *see* **Gaultheria.**

P. ciliaris (ciliated). *fl.* white; peduncles glandular. June. *l.* ovate-lanceolate, acute, having the margins denticulated and ciliated with bristles. Branchlets setose. *h.* 2ft. Mexico, 1849. Half-hardy. (G. C. n. s., x. 39.)

Pernettya—*continued.*

P. furens (maddening).* *fl.* white, in almost sessile, solitary, many-flowered, axillary racemes; lobes of corolla spreading, rather obtuse. March. *l.* alternate, 1½in. long, ovate-lanceolate, rarely sub-obovate, with serrated margins; petioles red. Chili. A low, moderately-branched shrub. (B. M. 4920.)

P. mucronata (mucronate).* Prickly Heath. *fl.* white; pedicels axillary, bracteate, about equal in length to the leaves. May to July. *l.* ovate, cuspidate, denticulate, serrulate, stiff, shining on both surfaces. *h.* 6ft. Magellan, 1828. (B. R. 1675.) SYN. *Arbutus mucronata* (B. M. 3093; L. B. C. 1848). A considerable number of handsome seedling varieties have been produced from this species, varying in the size and colour of the berries, these ranging from almost black to nearly white. Perhaps the finest forms have been raised by Mr. L. J. Davis, Hillsborough, co. Down.

P. m. angustifolia (narrow-leaved). A form with narrower leaves than the type. (B. M. 3889; B. R. 1840, 63, under name of *P. angustifolia.*)

P. Pentlandi (Pentland's). *fl.* white, ¼in. long, ovate-globose, solitary, axillary, drooping; pedicels red. June. *fr.* a berry, about the size of a large pea, dark blue-purple. *l.* crowded or sparse, ¾in. long and under, ovate or ovate-lanceolate, acute, serrulate, very coriaceous, shining. Branches and branchlets angled, setulose or glabrous, leafy. Andes, 1875. A rigid, branched, small shrub. (B. M. 6204.)

P. pilosa (pilose).* *fl.* white; corolla ovate, with blunt, revolute teeth. May. *l.* ovate-elliptic, ciliately serrulated, coriaceous, without mucro, and callous at the point. Stem pilose, procumbent. *h.* 6in. Mexico, 1839. SYN. *Arbutus pilosa.* (B. M. 3177.)

PERNETTYA (of Scopoli). A synonym of *Canarina.*

PERONIA. A synonym of **Thalia** (which *see*).

PERONOSPORA. A genus of minute Fungi, belonging to the "White Moulds," one of the groups included among the mildews. There are many species in the genus, and all of them are parasitic on plants, *i.e.*, they grow in and upon living plants. They prefer the leaves and young stems—at least they are most conspicuous upon these—but they run through all parts, from roots to seeds, though showing themselves usually only on the younger green organs. They are confined to herbs as their hosts, except in one or two cases, *e.g.*, *P. sparsa*, on leaves of Roses. Some of them grow on cultivated herbs in gardens, and are frequently most injurious to these plants. Several of the more destructive species are briefly described below; but a short account of the general structure and modes of reproduction characteristic of the genus must first be given. We select as a type *Peronospora nivea*, which is very common upon the leaves, stems, and roots of wild *Umbelliferæ*, and also upon the garden Carrot, Parsley, and Parsnip. A portion of a leaf attacked by this Fungus may be recognised by its yellowish-green colour above, passing into brown. The lower surface of the patch bears a white coating, which, under the microscope, is seen to consist of erect, branched stalks of very small size. These stalks emerge through the stomata of the leaf. Each is forked once or twice, and bears, towards the tip, from one to four horizontal branches, each forked once, twice, or thrice, and ending in straight, short branchlets. Each of the latter bears on its tip a small cell, called a conidium (see Fig. 91, *a*, *b*). On tracing the erect stalks downwards into the leaf, they are found to arise as branches from an abundant mass of filaments (mycelium) of a Fungus. This mycelium is spread through all parts of the plant, lying in the intercellular spaces, or boring through the cell-walls, and drawing nourishment from the contents of the cells by means of numerous minute suckers (haustoria). The host-plants are soon destroyed by the Fungus, and the diseased parts either dry up, or, if fleshy, *e.g.*, roots and tubers, they become soft, rotten, and pulpy. Reproduction is effected by means of the conidia and of oospores. The conidia do not at once reproduce the Fungus, but, when placed in water, their contents divide (see Fig. 91, *b*), into five or six small, egg-shaped masses, or zoospores, each furnished with two hairs (cilia), which they can move, and thus they can swim in water, *e.g.*, in a dewdrop or raindrop. After

Peronospora—*continued.*

a time, when on a suitable part of the plant, they push out tubes, and these pass through the stomata into the interior of the plant, and there reproduce the Fungus. This is the usual process in summer. The conidia and the zoospores, however, are unfit to resist intense cold; hence, another process of reproduction occurs in autumn, resulting in the formation of the oospores in the tissues of the host-plants. This latter process is as follows. On two neighbouring branches of mycelium-threads, inside the tissues of the host, two projections begin to form. One of these (oosphere) is globular; the other (antheridium) is oval, or clubbed, and much smaller, and a cell is cut off from the rest, at the end, by a partition. The antheridium comes to lie against the oosphere, and sends into it a kind of beak, which pierces its wall, and fertilises the contents. These contract,

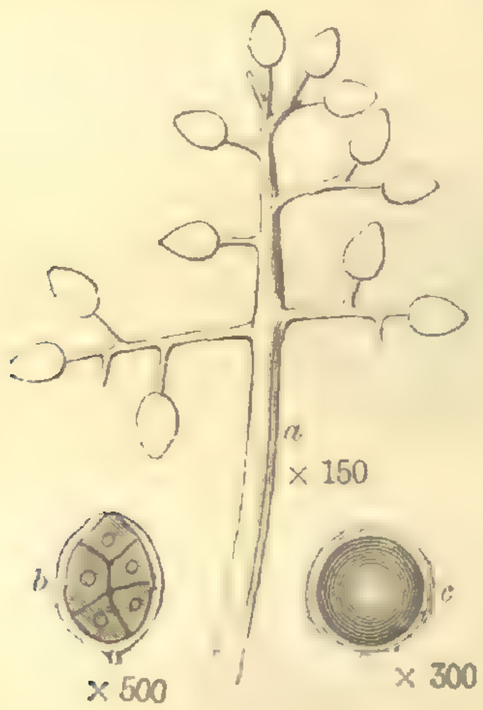


FIG. 91. PERONOSPORA NIVEA—*a*, Part of Conidiophore, with Conidia; *b*, Conidium, inclosing five Zoospores; *c*, Resting Spore.

become covered with a cell wall, and form the oospore (see Fig. 91, *c*). The outer wall of the oospore often bears ridges, or outgrowths, characteristic of the species. The oospores remain unchanged during winter, and in spring they reproduce the Fungus.

Remedy. Owing to the fact that the Fungi live *inside* the host-plants, and only produce their conidia outside them, it is impossible to destroy the parasite without destroying the host. Efforts should be directed against the spread of the disease, since a cure of the diseased plants is practically hopeless. All tissues attacked by *Peronosporæ* are liable to communicate the disease to healthy plants; hence, the former should, if possible, be burned, that being the only certain means of preventing the spread of the disease. Damp places, and confined air favour the Fungi; hence, drainage is of value, and the plants liable to injury should be separated, so far as can be done, to permit free circulation of air. Any means to strengthen the plants will probably render them better able to resist the evil influence of the Fungi. Warm, close, showery weather is peculiarly favourable to the spread of the latter, since it promotes the production of conidia, and aids the zoospores in diffusing themselves over neighbouring healthy plants by means of the drops of rain or dew.

In the case of the Potato-disease Fungus (*P. infestans*), numerous remedies have been proposed, *e.g.*, cutting off stems and leaves as soon as disease appears, Jensen's method of earthing-up the drills, &c. *See* **Phytophthora.**

The species of *Peronospora* are distinguished by differences in the erect branches that bear the conidia, and also in the markings of the outer coat of the oospores; but the latter bodies have, as yet, not been detected in some of these Fungi. The genus has been

Peronospora—*continued.*

divided into four sections by Professor de Bary, of Strasbourg, who has employed, as the basis of his arrangement, the modes of development of the zoospores, or mycelium, from the conidia, in forming new plants. This arrangement, however, is not of much assistance in making out the species of such Fungi as may be injuring any cultivated plants; and for ease of reference, therefore, in the following descriptions, the nature of the branching of the erect, fertile stems, and the markings of the outer coat of the resting spores, are chiefly employed.

1. *P. parasitica*, abundant on, and destructive to, many cruciferous plants, including Turnips and Cabbages. On the larger kinds of *Cruciferæ*, the Fungus is often confined to spots on the leaves. It has large, branched haustoria, or suckers, which often nearly fill the cells of the host-plants, from which they draw nourishment. The fertile stems are rather stout below, and five to eight times bifurcated; the branches are rather crowded, and end in slender, short branches, each of which bears on its tip an elliptical, colourless conidium. The conidium shows no papilla, and, in germination, emits a mycelium tube from any point of its surface. The oospore is globular, and has a thin, nearly smooth, outer coat.

2. *P. Viciæ* grows on Peas and Vetches, often doing considerable damage. The fertile stems are rather slender, six to eight times bifurcated, with the branches rather stiff and spreading, and the terminal branchlets rather longer than in most of the other species, and very slender. The conidia are grey, with a pale violet tint, but otherwise much as in *P. parasitica*. The oospore is globular, pale brown, with a network of ridges on the outer coat.

3. *P. effusa* attacks Spinach, and other *Chenopodiaceæ*, causing the leaves to become thickened, and to speedily decay. The fertile stems are rather short and thick, and bifurcate from two to seven times, ending in short, straight or hooked branches. They are grey, with a tinge of violet, as are also the elliptical conidia. The latter germinate as in *P. parasitica*. The oospore is pale brown, with irregular, brown ridges which render it, though globular, decidedly angular in outline. This species forms very dense tufts on the lower surface of the leaves.

4. *P. Schleideniana* grows on Onions and their allies. The fertile threads are rather stout, not, or scarcely, jointed, giving off branches along the sides alternately; branches usually three to five times bifurcated, and ending in short, hooked or spreading branchlets; conidia large, obovoid or nearly pear-shaped, all parts reddish-grey or dull violet. The conidia germinate from any part of their sides. The oospores are globular, brown, smooth, except for an open network of ridges.

5. *P. arborescens* lives on Poppies only, and hence is of no very great practical importance in Britain. It often causes distortions in the plants affected by it. The fertile stems are rather longer and more slender than usual, and are seven to ten times bifurcated; and the branches end in spreading, or hooked and very slender tips. The conidia are nearly round, small, colourless, and germinate from the side. The oospores are globular, brown, marked with a network of ridges.

6. *P. sparsa* is one of the few *Peronosporæ* on woody plants. It grows, as a delicate grey mould, on the under side of the leaves of Roses, in conservatories. The leaves become spotted with brown, and soon shrivel up. The fertile stems of the Fungus bifurcate several times, and end in curved tips, bearing round conidia, which germinate from the side. The oospores of this species have not been observed.

7. *P. nivea* has been already described. The spreading branches, bifurcated from one to three times; the ovoid, rather small conidia, with a papilla at the tip, and producing, not a germinal mycelium tube, but four or five

Peronospora—*continued.*

zoospores; and the smooth, unridged coat of the oospore, distinguish this parasite of the *Umbelliferæ*.

8. *P. ganglioniformis* is parasitic on many *Compositæ*, and among these is the Lettuce, to which it, at times, does much harm. The fertile stems are somewhat flattened and broad, bifurcated three to eight times, and bear at their tips a flattened enlargement, like a nerve ganglion (whence the specific name), on which, chiefly round the margin, stand from two to eight short, slender branchlets. Each of these bears a pale or colourless, nearly round conidium, provided with a minute wart at one end, from which the mycelium tube is emitted in germination. The oospore is yellowish-brown, its outer coat being slightly wrinkled.

9. *P. pygmæa* lives on *Anemone nemorosa* and on *Hepatica triloba*, as well as, occasionally, on cultivated Anemones. It is easily known by the fertile stems being short and stout, and thickened upwards to a kind of head, on which grow from two to six short, slender branchlets. Each of these bears an ovoid or elliptical conidium, which, in germination, gives out all the contents, through a small wart at one end. The oospore is pale brown, and has a smooth, wrinkled coat.

The three following species may possibly occur in Britain, though not yet recorded from this country.

P. viticola is parasitic in North America, on the native American Vines, and on the introduced European Vine. It has not yet crossed the Atlantic, but may easily be brought on the Vines so often imported from America to Europe, since it is abundant in the Eastern United States. It grows on all green parts, and destroys them, rendering them brown. The fertile stems are trifurcated far more often than bifurcated, and end in crowded, short branchlets, bearing elliptical conidia, which form zoospores. The oospore has a smooth, yellow, thick outer coat.

P. Cactorum causes decay and rottenness of the fleshy tissues of cultivated species of *Cactus*. The fertile stems bear a few branchlets, ranged along one side. The conidia are colourless, ovoid or elliptical, with a considerable wart on the tip, and through this the mycelial filament emerges in germination of the conidium. The oospore has a smooth, thick, pale brown outer coat. This disease has been the cause of a good deal of injury in botanic gardens in Germany.

P. Schachtii has frequently proved very destructive to Beets on the Continent. It forms a bluish-grey coat on the lower surface of the leaves, which become yellowish-green, wrinkled, and fleshy, and remain small. Frequently, the young shoots and the heart-leaves are destroyed. The fertile stems bear several short branches; the terminal branchlets are short, straight, blunt, spreading, and bear ovate, dull violet conidia. The oospores are unknown. The mycelium lives through the winter in the diseased plants, and resumes its growth in the young leaves during the following year. The seeds from diseased plants are often affected as shown by the appearance of the Fungus on the seedlings.

The Potato-disease Fungus, frequently described under the name of *Peronospora infestans*, Mont. (*e.g.*, in Cooke's "Handbook of British Fungi"), has, of late years, been placed in a separate genus, under the name *Phytophthora infestans*. For the characters distinctive of the genus, and the habits of and remedies for *P. infestans*, and of the only other species, *P. Fagi*, *see* **Phytophthora.**

PERSEA (a name applied by Theophrastus to an Egyptian tree). Alligator or Avocado Pear. ORD. *Laurineæ*. An extensive genus (about 100 species have been enumerated) of mostly stove trees or shrubs, all of which (except one species from the Canary Islands) are natives of tropical and sub-tropical Asia and America. Flowers disposed in panicles; perianth tube short; limb segments six, almost equal, or the three outer ones smaller; perfect stamens nine. Fruit often

Persea—*continued.*

large and fleshy. Leaves alternate or scattered, coriaceous, penniveined, or more or less distinctly triplinerved. The undermentioned species is the only one introduced, and it is rarely seen in cultivation. It thrives best in a compost of loam and fibry peat. Propagated, in autumn, by layers of the ripened shoots, or, in May, by cuttings of firm shoots, inserted in sand, under a bell glass, in heat.

P. gratissima (most-grateful). Alligator or Avocado Pear. *fl.* green, about ½in. across. *fr.* pear-shaped, yellow and brown, often tinged with deep purple, and about 4in. long. *l.* elliptical, narrow towards the base, about 6in. long. *h.* 25ft. to 30ft. West Indies, 1739. The flavour of the fruit somewhat resembles that of butter, or marrow, hence it is called "Vegetable Marrow" in the West Indies. It is so rich and mild that most people make use of some spice, or pungent substance, to give it poignancy; and wine, sugar, lime-juice, but mostly pepper and salt, are used. Marks made with the stone of the seed on a white wall will turn as red as blood, and cannot be effaced until the wall is whitewashed, and even then only with difficulty. (B. M. 4580; B. R. 1258.)

FIG. 92. FRUITING BRANCH, LEAF, AND STONE OF PERSICA DAVIDIANA.

PERSICA (so named in allusion to the Peach being supposed to come originally from Persia). Peach. ORD. *Rosaceæ*. A small genus of hardy or half-hardy fruit-trees,

Persica—*continued.*

now included, by Bentham and Hooker, under *Prunus*; they are natives of Europe and the warmer parts of Asia. Flowers almost sessile, solitary or twin, rising from the scaly buds earlier than the leaves. Leaves conduplicate when young. *P. vulgaris*, and its variety below described, are well known and much esteemed fruits. For culture, &c., *see* **Nectarine** and **Peach** respectively.

P. Davidiana (Abbé David's). *fl.* light rose or white. Spring (as soon as, or earlier than, the Almond). *fr.* small, spherical; skin downy, greyish-white, changing to yellow at maturity. *l.* glandular, regularly attenuated towards the base; margins very finely serrated. China. Only of use as an ornamental tree, but its flowering season being so early, the blossoms are frequently destroyed by frosts. See Fig. 92.

P. vulgaris (common).* Peach. *fl.* pale or dark red, sessile. Spring. *fr.* clothed with a velvety tomentum. *l.* lanceolate, glabrous, serrated. *h.* 15ft. Probably Eastern Asia, 1562. SYN. *Prunus Persica.* Of this species, there are several very desirable and ornamental varieties, including some with double flowers, and others with variegated and purple leaves.

P. v. lævis (smooth). Nectarine. *fl.* red. Spring. *fr.* smooth, glabrous. *h.* 15ft. 1562. The Nectarine is distinguished from the Peach by its smooth, and rather firmer, more plump fruit. SYN. *Prunus lævis.*

PERSIMMON. *See* **Diospyros virginiana.**

PERSISTENT. Not falling off, but even remaining on the fruit, or lasting throughout winter, as the leaves of evergreens.

PERSONATÆ. Included under *Scrophularineæ.*

PERSOONIA (named after C. H. Persoon, 1755-1837, a distinguished botanist, author of "Synopsis Plantarum" and other botanical works). SYNS. *Linkia, Pentadactylon.* ORD. *Proteaceæ.* A genus comprising sixty species of greenhouse, ornamental shrubs or small trees; one is a native of New Zealand, and the rest are all Australian. Flowers yellow or white, small or mediocre, solitary in the axils, or, owing to the abortion of the floral leaves, forming short racemes, rarely in slender, terminal, one-sided racemes; perianth regular, the segments recurved in the upper portion. Leaves entire, alternate, or rarely here and there almost whorled. A selection of the species best known to cultivation is given below. They require a compost of equal parts loam, peat, and sand. Cuttings of the ripened shoots will root readily in sand, under a bell glass. The undermentioned species are shrubs, except where otherwise stated.

P. Drummondii (Drummond's). A synonym of *P. longifolia.*

P. ferruginea (rusty).* *fl.* yellow, solitary in the axils, or often densely clustered, terminal or pedunculate in the upper axils; perianth densely ferruginous-pubescent. June. *l.* ovate, oblong-elliptical, or almost lanceolate, acute or obtuse, with a callous point, 2in. to 4in. long. Young branches and shoots slightly ferruginous or hoary-tomentose. *h.* 3ft. 1823. (S. E. B. ii. 83.)

P. Fraseri (Fraser's). A synonym of *P. saccata.*

P. hirsuta (hairy). *fl.* yellow, very shortly pedicellate, solitary within each floral leaf, but crowded into short heads or clusters at or below the ends of the branches. June. *l.* crowded, narrow-linear, acute and rigid, but scarcely pungent-pointed, channelled beneath, with revolute margins, mostly about ½in. long. *h.* 2ft. to 3ft. 1800. Plant pubescent or hirsute, spreading. (L. B C. 327.)

P. lanceolata (lanceolate). *fl.* yellow; pedicels exceedingly short, solitary or two together. June. *l.* lanceolate or oblong-lanceolate, mucronate-acute, much contracted into a short petiole, mostly 1½in. to 2½in. long, flat. Young branches and shoots hoary-pubescent. *h.* 4ft. 1791. (A. B. R. 74; L. B. C. 25.)

P. l. lævis (smooth). *l.* rather longer and thinner than in the type, broad and narrow. Whole plant glabrous. (A. B. R. 280 and L. B. C. 1509, under name of *P. latifolia.*)

P. linearis (linear-leaved). *fl.* yellow, on solitary pedicels. July. *l.* rather crowded, linear, acute or almost obtuse, contracted at the base, 1in. to 2in. long. *h.* 10ft. to 20ft. 1794. A tall shrub or small tree. SYNS. *P. pinifolia, P. pruinosa.* (A. B. R. 77; B. M. 760.)

P. longifolia (long-leaved).* *fl.* yellow, solitary in the axils, but, owing to the abortion of floral leaves, forming often terminal or sub-terminal racemes. July. *l.* linear or linear-lanceolate, 5in. to 8in. long, callous-pointed or obtuse, narrowed into a short petiole. *h.* 10ft. to 20ft. 1850. A tall shrub or small tree. SYN. *P. Drummondii.*

Persoonia—*continued.*

P. macrostachya (large-spiked). A synonym of *P. saccata.*

P. nutans (nodding). *fl.* yellow; pedicels axillary, solitary or rarely twin, spreading or at length reflexed. July. *l.* narrow-linear, acute, contracted at base, ¾in. to above 1in. long, flat or with the margins slightly recurved. *h.* 1ft. 1824. An erect, but low and bushy shrub. (L. B. C. 922, under name of *P. flexifolia.*)

P. pinifolia (Pine-leaved). A synonym of *P. linearis.*

P. pruinosa (bedewed). A synonym of *P. linearis.*

P. rigida (rigid).* *fl.* yellow, almost sessile and solitary in the axils, but sometimes several crowded at the base of axillary shoots; perianth densely villous. June. *l.* varying from obovate to linear-spathulate, mucronate, much contracted at the base, but scarcely petiolate, ¾in. to 1½in. long, the margins usually recurved or replicate, softly or scabrous-pubescent when young, glabrous when old. *h.* 3ft. to 4ft. 1824. (L. B. C. 1199, under name of *P. spathulata.*)

P. saccata (pouched). *fl.* yellow; pedicels mostly at or below the ends of the branches, and crowded into racemes; upper segment of perianth saccate. July. *l.* linear-terete, sometimes almost filiform, 2in. to 4in. or more long. *h.* 2ft. to 6ft. 1837. SYNS. *P. Fraseri, P. macrostachya.*

P. Toro (Toro). *fl.* yellowish; racemes 1in. long, six to ten-flowered. Summer. *l.* 3in. to 8in. long, very narrow, linear-lanceolate, gradually narrowed into the petiole, acuminate or obtuse and apiculate, quite entire, polished on both surfaces. New Zealand. A small tree.

PERSOONIA (of Michaux). A synonym of **Marshallia** (which *see*).

PERTUSE. Having slits or holes.

PERU BALSAM-TREE. *See* **Myroxylon peruiferum.**

PERU, MARVEL OF. *See* **Mirabilis Jalapa.**

PERUVIAN-BARK-TREE. *See* **Cinchona.**

PERUVIAN MASTIC-TREE. *See* **Schinus Molle.**

PES. The Latin for the foot or stalk; *e.g.*, in compounds, Brevipes, short-stalked; Longipes, long-stalked, &c.

PESCATOREA. Included under **Zygopetalum** (which *see*).

PESOMERIA. Included under **Phaius** (which *see*).

PETAL. The divisions of the corolla, when free—that is to say, not united by their edges to each other—are called Petals.

PETALACTE (from *petalon*, a petal, and *acte*, a ray; referring to the rayed, petal-like scales on the receptacle). SYN. *Petalolepis.* ORD. *Compositæ.* A monotypic genus, the species being a greenhouse, evergreen, hoary-tomentose or woolly sub-shrub. It requires culture similar to **Helichrysum** (which *see*).

P. coronata (crowned). *fl.-heads* white, small, heterogamous, disposed in terminal, crowded cymes or corymbs; achenes glabrous or papillose; involucre campanulate; receptacle small. May. *l.* alternate, entire, obtuse. *h.* 1ft. South Africa, 1816.

PETALIDIUM (from *petalon*, a petal,; in reference to the petal-like bracteoles). SYN. *Pseudobarleria.* ORD. *Acanthaceæ.* A small genus (three species have been described) of unarmed shrubs, inhabiting the East Indies and tropical and Southern Africa. Flowers solitary, in the axils of the upper leaves, shortly pedicellate or sub-sessile. Leaves ovate, entire or dentate. The only species in cultivation is *P. barlerioides*, a pretty stove evergreen. For culture, *see* **Justicia.**

P. barlerioides (Barleria-like). *fl.* white, pedunculate, axillary, solitary, large. June. *l.* ovate, slightly toothed. *h.* 4ft. India, 1840. (B. M. 4053.)

PETALOID. Similar to a petal in colour and texture.

PETALOLEPIS (of Lessing). A synonym of **Petalacte** (which *see*).

PETALOSTEMON (from *petalon*, a petal, and *stemon*, a stamen; referring to the peculiar union of

Petalostemon—*continued.*

these organs in this genus). Prairie Clover. ORD. *Leguminosæ.* A genus comprising about fourteen species of pretty, hardy or half-hardy herbs, usually perennial, gland-dotted, closely allied to *Dalea*; they are confined to the warmer parts of North America. Flowers rose-coloured, purplish-violet, or white; calyx teeth or lobes sub-equal; standard heart-shaped or oblong; heads or spikes terminal, or opposite the leaves, often pedunculate, sub-sessile. Leaves impari-pinnate; leaflets small, entire, exstipellate; stipules minute, setaceous. The best-known species in cultivation are *P. candidus* and *P. violaceus*; these thrive in a compost of sandy loam with a little peat or leaf mould. They may be increased by divisions, in spring. Both are hardy perennials.

P. candidus (white).* *fl.*, corolla white; heads oblong, when old cylindrical. July. *l.*, leaflets seven to nine, lanceolate or linear-oblong. *h.* 1ft. 1811.

P. violaceus (violet).* *fl.*, corolla rose-purple; heads globose-ovate, or oblong-cylindrical when old. July. *l.*, leaflets five, narrow-linear. *h.* 1ft. 1811. (B. M. 1707.)

PETAMENES. A synonym of *Antholyza.*

PETASITES (an old Greek name used by Dioscorides, from *petasos*, an umbrella; alluding to the size of the foliage). Including *Nardosmia.* ORD. *Compositæ.* A genus comprising about a dozen species of hardy, more or less white-tomentose or woolly herbs, with perennial rhizomes or stems, natives of Europe, Asia, and North America. Flower-heads purple or white, rarely yellowish-white, heterogamous, mediocre, racemose or thyrsoid-paniculate at the tips of the scapes; involucre campanulate or cylindrical; receptacle flat, naked. Leaves radical, often ample, cordate or reniform. Scapes or stems many-headed, with the leaves reduced to alternate scales, or rarely with the lower ones more evolute. Many of the species formerly included under *Tussilago* are now referred, by Bentham and Hooker, to this genus. All succeed in any ordinary soil, and may be increased by divisions. Some of the species are rather pretty. The following are among the best-known.

P. alpina (alpine). A synonym of *Homogyne alpina.*

P. fragrans (fragrant).* *fl.-heads* white, sweet-smelling; involucral scales acute. February. *l.* cordate at base, orbiculate-cartilaginously toothed; lobes sub-rotund at base. *h.* 6in. South-western Europe, 1806 (naturalised here and there in Britain). (G. C. n. s., ix. 147.) SYN. *Tussilago fragrans* (B. M. 1388).

P. frigida (frigid).* *fl.-heads* white. April and May. *l.* rounded, somewhat reniform, white-woolly beneath, palmately and deeply five to seven-lobed, 6in. to 10in. broad; lobes toothed and cut. *h.* 6in. Arctic regions, 1778. SYN. *Tussilago frigida.*

P. niveus (snowy). *fl.-heads* white, borne on simple pedicels. March. *l.* broadly cordate, sub-triangular, toothed, slightly glabrous above, snowy-tomentose beneath; lobes divaricate, sub-acute. *h.* 1ft. Europe, 1713.

P. vulgaris (common). Bog Rhubarb; Butter Bur. *fl.-heads* borne in cylindric panicles, 3in. to 10in. long, the female longest, elongating after flowering; pedicels slender. March to May. *l.* 3in. to 3ft. in diameter, reniform or orbicularly cordate, irregularly toothed, white or cobwebby beneath, and, when young, above also. Stems 4in. to 18in. high, stout, purplish below. Europe (Britain), &c. SYNS. *Tussilago hybrida* (this name represents the female plant) and *T. Petasites.* (Sy. En. B. 783, 784.)

PETASOSTYLIS. Included under **Leianthus** (which *see*).

PETIOLAR. Borne on, or relating to, a petiole.

PETIOLE. The footstalk of a leaf.

PETIOLULE. The footstalk of a leaflet.

PETIVERIA (named after James Petiver, F.R.S., 1665-1718, an apothecary and distinguished botanist, of London). SYN. *Mapa.* ORD. *Phytolaccaceæ.* A monotypic genus (according to the authors of the "Genera Plantarum"). The species is an ornamental, slender, erect, glabrous or puberulous, dichotomously-branched stove herb, shrubby at base, with an alliaceous

Petiveria—*continued.*

smell. It thrives in a mixture of loam and peat, and may be increased by cuttings of the half-ripened wood, rooted in bottom heat.

P. alliacea (Onion-like). Guinea-hen Weed. *fl.* white, very shortly pedicellate, small, disposed in axillary and terminal racemes; perianth conical at base, with four spreading, persistent segments. June. *fr.* erect. *l.* alternate, petiolate, ovate, entire, membranous, 3in. to 4in. long (including the short petiole), 1½in. broad, attenuated at both ends, pellucid-dotted. Stem 2ft. to 3ft. high. Mexico to Brazil. (L. B. C. 148.)

P. a. octandra (eight-anthered). *fl.* with eight anthers and purplish filaments. *l.* smaller, and stem shorter, than in the type. SYN. *P. octandra.*

P. octandra (eight-anthered). A synonym of *P. alliacea octandra.*

PETRÆA (Linnæus dedicated this genus to Robert James, Lord Petre, a famous patron of botany, who died in 1742). ORD. *Verbenaceæ.* A genus comprising about a dozen species of beautiful, twining or arborescent, stove shrubs, natives of tropical America. Flowers violet, purple, or bluish, shortly pedicellate in the axils of the bracts; calyx lobes five, large, prettily coloured at the flowering season; corolla often intensely coloured, with a short tube, and an oblique, five-fid limb; racemes elongated, terminal or in the upper axils. Leaves opposite, coriaceous. The species described below, which are, probably, all in cultivation, should be planted in good, rich mould, and kept in a strong heat. Propagation may be readily effected by cuttings, inserted in light sandy soil, under a glass. *P. volubilis* is an extremely handsome twiner.

P. arborea (tree-like).* *fl.* blue, saturated with violet, disposed in copious, axillary or solitary, loose, pendulous racemes, 6in. long. June. *l.* oblong-lanceolate, obovate-oblong, or elliptic, narrowed at base, 4in. to 7in. long, 1½in. to 2½in. broad, sub-cordate, very shortly petioled, obtuse or retuse, and mucronate at apex, entire. *h.* 12ft. South America, 1823. Arboreous. (L. B. C. 1606, under name of *P. erecta.*)

P. macrostachya (large-spiked). *fl.* lilac, disposed in terminal, elongated, pendulous racemes, which are 1½ft. to 2ft. long; pedicels shorter than the calyx tube. June. *l.* petioled, lanceolate, oblong, or oval-elliptic, 4in. long, 2½in. broad, shortly acuminate at both ends, mucronate, entire, undulated. *h.* 20ft. South America. Twiner. (P. M. B. iv. 99, under name of *P. Stapeliæ.*)

P. rugosa (wrinkled). *fl.* blue, shortly pedicellate, disposed in axillary or terminal, solitary, erect, loose racemes. July. *l.* rigid, very shortly petioled, elliptic, sub-cordate at base, and slightly rounded or retuse at apex, mucronate, entire, 2in. to 2½in. long, 1¼in. to 1½in. broad, with reflexed margins, reticulately wrinkled above. *h.* 6ft. to 8ft. Caraccas, 1824. Arboreous.

P. volubilis (twining).* Purple Wreath. *fl.* purple, on pedicels twice as long as the calyx tube, and disposed in a single, terminal, elongated, nodding raceme, about 6in. long. July. *l.* 3in. to 4in. long, very shortly petioled, ovate, elliptic, or oblong, rounded or slightly narrowed and loosely cordate at base, acuminate or obtuse, mucronate, entire, undulated. *h.* 20ft. Panama, &c., to Brazil, 1733. (B. M. 628.)

PETRÆUS, PETROSUS. Growing in rocky or stony places.

PETROBIUM (from *petros*, a rock, and *bio*, to live; alluding to the habitation of the species). SYN. *Laxmannia* (of Forster). ORD. *Compositæ.* A monotypic genus, the species being an ornamental, stove tree. It thrives in sandy loam, and may be increased by cuttings, which root readily in a similar soil.

P. arboreum (tree-like). *fl.-heads* yellow, dicecious, mediocre or rather small, disposed in corymbose, leafy panicles, at the apices of the branches; involucre campanulate; bracts few; receptacle small, flat; achenes hispidulous, scabrous. June. *l.* opposite, dentate. St. Helena, 1816.

PETROCALLIS. Included under **Draba** (which *see*).

PETROCARYA. A synonym of **Parinarium** (which *see*).

PETROCOPTIS. Included under **Lychnis** (which *see*).

PETROMARULA. Included under **Phyteuma** (which *see*).

PETROPHILA (from *petros*, a rock or stone, and *phileo*, to love; in allusion to the place of growth). ORD. *Proteaceæ*. A genus comprising thirty-five species of Australian, greenhouse shrubs. Flowers usually white or yellow, in dense, terminal or rarely axillary spikes or cones; perianth tube slender, separating into four segments from the base, or remaining united, the limb of four linear laminæ. Fruit a small, sometimes winged nut. Leaves scattered, rigid, entire or divided, frequently terete or narrow. It is doubtful if even the few species here described are still in cultivation. For culture, *see* **Banksia.**

P. acicularis (needle-shaped).* *fl.* white, red; cones terminal and sessile, nearly globular, about ¾in. in diameter. May. *l.* undivided, usually slender, terete, and more or less distinctly grooved on the upper side, obtuse, or with a short, straight, curved point. *h.* 2ft. 1830. (B. M. 3469.)

P. glanduligera (gland-bearing). A synonym of *P. Serruriæ*.

P. heterophylla (variable-leaved). *fl.* white; cones all axillary, sessile, ovoid-oblong, the old ones ¾in. long. June. *l.* linear or linear-lanceolate, 2in. to 4in. long, more or less flattened, entire and acute or dilated towards the end, and then often truncate or notched, with a small point in the notch, or deeply divided into two or three lobes. *h.* 4ft. 1840.

P. pulchella (pretty). *fl.* white; cones terminal, sessile, solitary or with one or two axillary ones close below, oblong or cylindrical, 1in. to 1½in. long. July. *l.* 1½in. to 2½in. long, twice or thrice pinnate; segments numerous, not spreading, terete, grooved above, rather slender, not pungent. *h.* 6ft. to 8ft. 1840. (B. M. 796, under name of *Protea pulchella*.)

P. rigida (rigid). *fl.* white; perianth nearly ¾in. long; cones terminal or in the forks of the branches, sessile, nearly globular. May. *l.* very rigid, trichotomously bipinnate; ultimate segments sometimes ½in. to 1in. long, all terete, divaricate, and pungent-pointed. *h.* 2ft. to 3ft. 1823. A rigid shrub.

P. Serruriæ (Serruria-like). *fl.* white; perianth tipped with small, stipitate glands; cones ovoid or at length conical, sessile or shortly pedunculate in the upper axils, often crowded in terminal clusters. May. *l.* rarely above 1in. long and broad, crowded, twice or thrice-pinnate, with the lower segments close to the base; segments numerous, slender, terete, grooved above. *h.* 3ft. to 4ft. 1840. SYN. *P. glanduligera*.

PETROPHYES. A synonym of **Monanthes** (which *see*).

PETTERIA (named in honour of Franz Petter, who wrote an account of a botanical tour in Dalmatia in 1832). ORD. *Leguminosæ*. A monotypic genus. The species is a hardy, erect shrub, requiring culture similar to **Cytisus** (which *see*).

P. ramentacea (ramentaceous). *fl.* disposed in dense, terminal, pedunculate, pyramidal, erect racemes; calyx campanulate, three-lobed, the lobes tomentose-ciliate, obtuse; corolla glabrous; keel silky-villous; pedicels hoary. Spring. *l.* ternate, petiolate; leaflets elliptic, entire, cuneate at base, obtuse or retuse at apex, glabrous. Dalmatia, 1838. (B. R. 1843, 40, under name of *Cytisus Weldenii*.)

PETTIGREE, or **PETTIGRUE.** *See* **Ruscus aculeatus.**

PETTYWHIN. A common name for *Genista anglica* and *Ononis arvensis*.

PETUNGA (*Peetunga* is the Bengalese name of *P. Roxburghii*). SYNS. *Higginsia* (of Blume), *Spicillaria*. ORD. *Rubiaceæ*. A genus consisting of four or five species of glabrous, stove shrubs, with terete, twiggy branchlets, natives of Eastern Bengal, the Malay Peninsula, and the islands of the Indian Archipelago. Flowers white, small, disposed in short, axillary, simple or somewhat compound spikes, sessile or shortly pedicellate, bibracteolate; calyx persistent, tube ovoid, limb four-toothed; corolla funnel-shaped, with a short tube, a very villous throat, and four spreading, oblong lobes. Leaves opposite, petiolate, oblong or lanceolate, narrowed to both ends. *P. Roxburghii* is an ornamental shrub, requiring culture similar to that recommended for **Catesbæa** (which *see*).

P. Roxburghii (Roxburgh's). *fl.* small; spikes about one-half or one-third shorter than the leaves; bracts and calyx glabrous. May. *l.* elliptic-oblong, glabrous, drooping, 3in. to 4in. long, and about 1in. broad; stipules large, caducous. *h.* 3ft. to 8ft. India, 1820.

PETUNIA (from *petun*, the Brazilian name of tobacco; alluding to the affinity of this genus with *Nicotiana*). ORD. *Solanaceæ*. A genus comprising about a dozen species of highly ornamental, hardy or half-hardy, annual or perennial herbs, often viscid-pubescent, branched; they inhabit Brazil and the Argentine Republic, one being broadly dispersed from Western South America to Brazil. Flowers violet or white, sometimes showy, sometimes small, on solitary pedicels; calyx deeply five-fid or nearly five-parted; corolla funnel or salver-shaped, the tube cylindrical, or swollen above; limb plicate, equal or oblique-spreading, the lobes short, broad, and loosely bilabiate and imbricating at the apex; stamens five, affixed below or at the middle of the tube. Leaves entire, usually small.

Petunias are very showy and popular plants, effective when grown in pots, and also in summer flower beds outside. *P. nyctaginiflora* and *P. violacea* are species from which the numerous garden varieties are supposed to have been obtained; as they were not introduced until early in the present century, the cultivation of the plant under notice does not extend any further back. For a long period, considerable attention was paid by florists to the improvement of Petunias, and excellent results were obtained. Less has been done of late years in selecting and naming varieties; still, the plant is far from being allowed to fall into neglect. In some parts, particularly in the West of England, it is most successfully cultivated for exhibition.

Petunias may be raised in any quantity from seeds, and named kinds readily propagated from cuttings. Seeds, which are very minute, should be sown, during March, in pans of light, finely-sifted soil, very slightly covered, and placed in a gentle warmth. They usually vegetate in a very short time, and, before the seedlings become crowded, they should be carefully pricked off in other pans or pots. Afterwards, when large enough, pot them off singly, pinch out the points before they get very high, to induce a compact habit, and keep growing on in an intermediate house, or a low pit. Early in May, those intended for planting out should be gradually inured to the open air, and others, retained for flowering inside, should receive the final potting, and be kept in frames where plenty of air can be admitted. The plants flower profusely at the latter part of summer and in autumn, when they prove very useful and effective for greenhouse decoration. Plants for providing cuttings in spring should be preserved through the winter in a warm greenhouse. They may be obtained by striking some cuttings, in autumn, for the purpose. Young shoots root readily in a close frame, during February and March, and plants thus obtained may be grown on with little trouble. Petunias succeed best in a compost of about two parts loam to one of manure. They require plenty of water all through the summer. Slender stakes are necessary, to keep the plants from falling about.

The three species known in gardens are described below.

P. acuminata (taper-pointed). A synonym of *Nicotiana acuminata*.

P. intermedia (intermediate). *fl.* axillary or opposite the leaves; corolla ¾in. long and broad, pubescent-glandular without; tube yellow-striated, longer than the calyx; limb large, purple, with a paler margin; peduncles ½in. to 1in. long, filiform. August. *l.* linear-oblong, sub-spathulate, obtuse, attenuated at base, entire, sessile, 1in. to 1½in. long. Stem erect, branched, leafy. *h.* 1ft. Buenos Ayres, 1832. Half-hardy perennial, at length becoming sub-shrubby. (B. R. 1931.) SYNS. *Nierembergia intermedia* (P. M. B. ii. 219; S. B. F. G. ser. ii. 237), *Salpiglossis linearis* (B. M. 3256).

P. nyctaginiflora (Nyctaginia-flowered). *fl.* on axillary, solitary, one-flowered peduncles, far exceeding the leaves; corolla white, large, the tube cylindrical, three or four times as long as the calyx; limb very spreading. August. *l.*, cauline ones solitary, ovate, oblong, slightly obtuse, nearly or quite sessile; floral ones sessile, cordate-ovate, twin, nearly opposite. *h.* 2ft. South America, 1823. A diffuse, villous-glandular, half-hardy perennial. See Fig. 93. (B. M. 2552; P. M. B. ii. 173; S. B. F. G. 119.)

Petunia—*continued.*

P. violacea (violet). *fl.* on pedicels 2in. long; corolla purplish-violet, very elegant, 1in. or more long, infundibuliform-campanulate, with a ventricose tube and a sub-equal limb. August. *l.* ovate, shortly petiolate, ovate-lanceolate, acute; floral ones

FIG. 93. FLOWERING BRANCH OF PETUNIA NYCTAGINIFLORA.

twin. Stems numerous, 6in. to 10in. long, prostrate, erect and slightly branched at apex. Buenos Ayres, 1831. Half-hardy perennial. See Fig. 94. (B. M. 3556; B. R. 1626; P. M. B. i. 7.) SYNS. *Nierembergia phœnicea* (S. B. F. G. ser. ii. 193), *Salpiglossis integrifolia* (B. M. 3113).

FIG. 94. FLOWERING BRANCH OF PETUNIA VIOLACEA.

Varieties. Named varieties of Petunias are not met with nearly so often of late years as formerly, the more

FIG. 95. FLOWER OF SINGLE GARDEN PETUNIA.

general system of culture now being that of growing plants from seed annually. In the single varieties, re-

Petunia—*continued.*

presented in Fig. 95, there is a great diversity of colouring; some are selfs, others are beautifully veined, striped, or marked in various ways. Only single varieties were grown at first; afterwards, semi-double forms began to appear; and now the latter are numerous, very full,

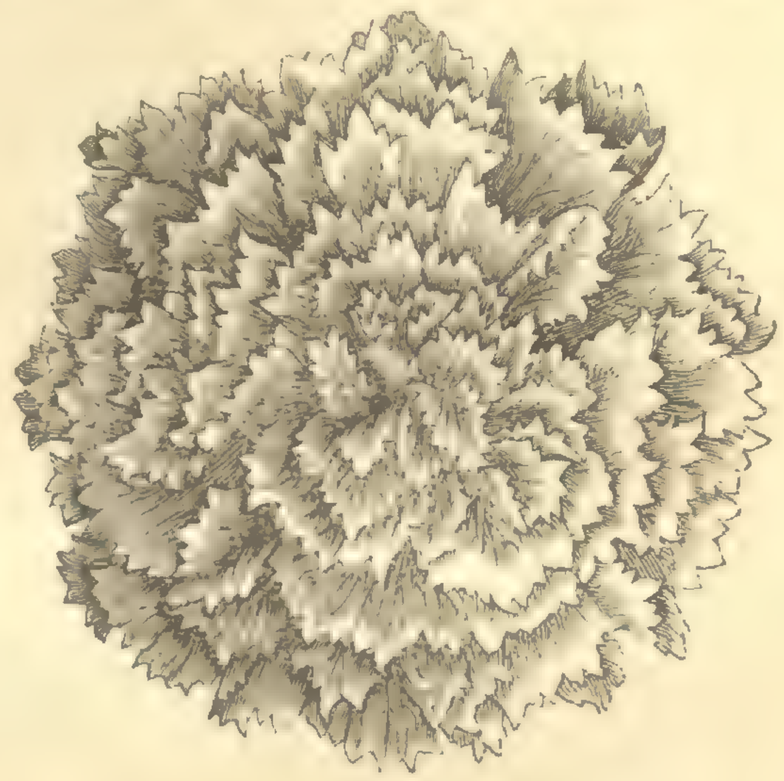


FIG. 96. FLOWER OF DOUBLE GARDEN PETUNIA.

and also beautifully fimbriated, as shown in Fig. 96. A selection of named varieties is subjoined. Those with double flowers do not succeed well outside; they should be grown in pots, under glass.

Double Varieties. ADONIS, white, suffused and blotched purple, fringed. AIDA, deep rose-purple, blotched white; large. ALICE, rosy-purple, splashed and suffused white, beautifully fringed. BAYARD, maroon-purple, self. BEAUTY OF MANNAMEADE, white, blotched and tipped claret-purple. BEAUTY OF RUNNYMEDE, rich purple-plum, tipped and blotched white CONCOLORE, pearly-white, blotched light purple; large, beautifully fimbriated; distinct and fine. DE CANDOLLE, deep crimson-purple, edged and blotched white; free. HIBERNIA, rosy-purple, edged green; peculiar. LABYRINTH, white, edged and tipped with rosy-purple, full, and fringed. MADAME HENGIST, purple, edged white. M. A. LOHIER, pure white blotched deep magenta, beautifully fimbriated; fine. MINNIE EVANS, rosy-purple, mottled and flaked white. MRS. WEBB, deep lilac-mauve, beautifully veined with crimson-purple, fringed; very large. OPHELIA, pure white, marked with deep purplish-crimson; large and fine. PERFECTION, deep rose; very double and effective. POSTHUMIA, white, beautifully blotched rosy-purple; fine. ROMULUS, rose, suffused white, veined crimson; large.

Single Varieties. AVALANCHE, white, tipped and tinged rose; medium size, distinct. BEAUTY, white, edged and barred purple; large. BOULE DE NEIGE, satiny-white, throat slightly tinted lavender; free and effective. CANNELL'S FAVOURITE, rosy-red, suffused purple; very large, of good substance. CHARMER, crimson, suffused purple, edged and striped white; large and fine. CLAIRVOYANT, white, distinctly edged and barred crimson and maroon; large. DELICATA, white, barred purple. DR. DANIEL, crimson-maroon, white throat; free, and of good habit. DR. HOGG, deep magenta, white throat, heavily veined purple; large. DR. TUCKER, rosy-purple, large throat, veined and netted. ELEGANS, white, suffused and barred purple-crimson, fimbriated. LITTLE PET, soft pink, veined maroon; pretty and distinct. MISS MINNEY, deep lilac, edged white, veined purple. MRS. A. MAYES, white, marked with bars of purple from centre; good habit. MRS. S. HIBBERD, white, striped from centre with maroon; fine. MRS. W. ELDER, white, edged with bright purple, fine shape. PURPLE KING, deep plum-purple, black throat; very rich and distinct colour. SPITFIRE, intense bright purple, shaded crimson; a good bedder.

PEUCEDANUM (the old Greek name used by Hippocrates). Including *Pastinaca*. ORD. *Umbelliferæ*. A genus comprising about 100 species of perennial, very rarely annual, herbs, shrubs, or rarely trees, dispersed over the Northern hemisphere, the Andes of tropical America, and tropical and Southern Africa. Flowers white or yellow, rarely pink, often polygamous, in compound, frequently many-rayed umbels. Leaves pinnately or ternately decompound, rarely simply pinnate. The species are of little horticultural value. The following

Peucedanum—*continued.*

are British plants: *P. officinale* (Sulphurwort), *P. Ostruthium* (Masterwort), *P. palustre* (Milk Parsley), and *P. sativum* (Wild Parsnip). For culture of the last-named, *see* **Parsnip.**

P. sativum (cultivated). Parsnip. *fl.* bright yellow, small; umbel-rays many, stout, long. July and August. *l.* shiny, pinnate; leaflets two to five pairs, 1in. to 3in. long, sessile, ovate, inciso-serrate. Stem 2ft. to 3ft. high, stout, angled, furrowed, fistular. Europe (Britain), Siberia. Annual or biennial. The Parsnip has been cultivated since the time of the Romans. SYN. *Pastinaca sativa.*

PEUMUS (said to be the native name in Chili). SYNS. *Boldea, Ruizia.* ORD. *Monimiaceæ.* A monotypic genus. The species is a small, greenhouse, evergreen, fragrant tree. It succeeds in a compost of sandy peat, and may be increased by cuttings.

P. Boldus (Boldus). *fl.* white, dicœcious, disposed in terminal cymes, which are shorter, or scarcely longer, than the leaves; male perianth larger than the female, of ten or twelve lobes, two or three-seriate, imbricated. May. *l.* opposite, or rarely alternate, coriaceous, ovate-elliptic, acute, entire. *h.* 20ft. Chili, 1844. (B. R. 1845, 57, under name of *Boldoa fragrans.*) The leaves are used in medicine for the purpose of assisting digestion, &c. The fruit is sweet, and is eaten in Chili, and the bark is used for tanning.

PEYROUSIA, of Sweet. A synonym of **Lapeyrousia** (which *see*).

PEZIZA. A large genus of Fungi, of which by far the greater number live on decaying remains of animals or of plants, or on dung or earth in which there is abundance of decaying organic matter. A few grow upon and injure living plants, both wild and cultivated. The vegetative system of the Fungus consists of mycelium hidden in the substance on which it grows. The conspicuous part, by means of which the species are identified by mycologists, is that specialised for reproduction.

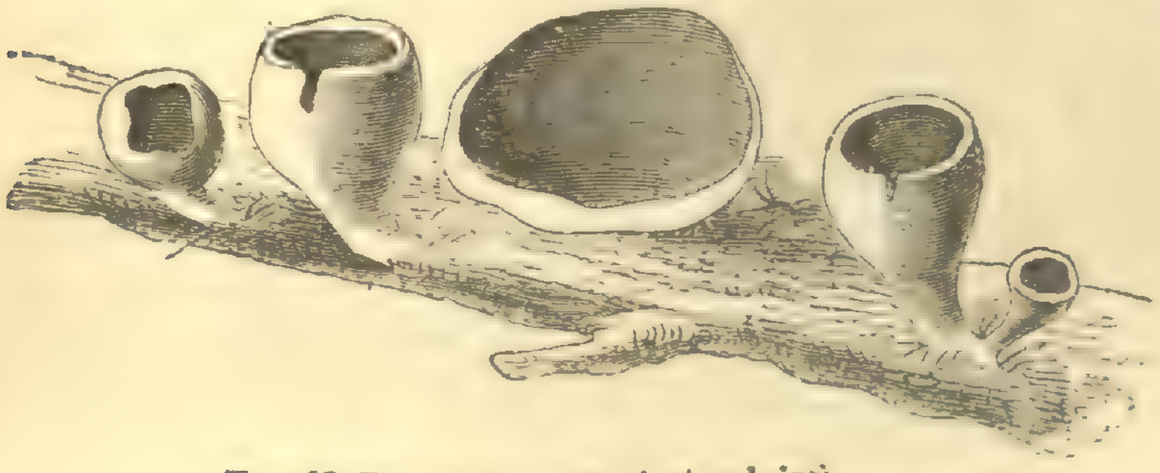


FIG. 97. PEZIZA COCCINEA (natural size).

This is in the form of a cup, rather shallow in some, deep in others (see Figs. 97, 98, and 99). This large genus has been broken up into sections, treated by some mycologists as genera, characterised by consistence, presence or absence of a stalk, of hairs externally, of a membrane closing the young cups, &c.; but the assemblage of species, as a whole, is a very natural one. They vary in size of cups from several inches across to a size too small to be seen without a lens. The inner surface of the cup is lined with a layer of large cells, of cylindrical or club-shaped form (asci), standing erect (see Fig. 98, *d*), in each of which lie eight small, oval, smooth, or, less often, warty cells (spores), which are set free by the asci bursting at the end next the surface. Sometimes the spores are emitted in a thin cloud, when the Fungus is exposed to dry air.

While many of the species produce the cups on a mycelium of loosely-woven hyphæ, or filaments, formed in the substance from which the Fungus is drawing its nourishment, other species form a sclerotium, *i.e.*, a mass composed of densely interwoven hyphæ grown together, so as to resemble a true tissue (see Fig. 99, *sc*). This body is usually black and hard outside, but pale and soft inside. It is fitted to resist changes of temperature during winter; and in spring it aids in reproduction by

Peziza—*continued.*

producing one or more cups, of the structure described above. A very common and well-known example is the sclerotium, so common in winter on dead herbaceous stems, called *S. durum.* In spring, there is a grey mould, formed largely on it (*Polyactis cinerea*), which produces myriads of round conidia or spores. Later on, long-stalked cups of a *Peziza* (*P. Fuckeliana*) grow out from the same sclerotium.

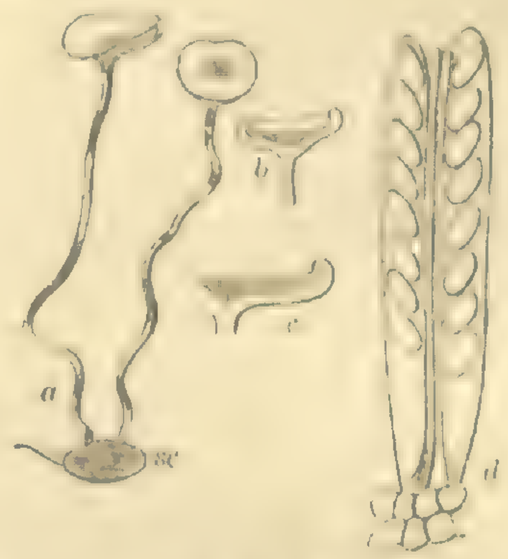


FIG. 98. PEZIZA POSTUMA—*a*, Small Specimen (natural size), with two Cups on slender stalks, which rise from an oval Sclerotium (*sc*); *b*, Cup, cut lengthwise; *c*, Section of Half of Cup, showing surface-layer of Asci; *d*, Two Asci, each with eight Spores, arising from small-celled Tissue of Cup (magnified about 250 times).

These remarks must be restricted to the species of *Peziza* that give rise to disease in cultivated plants, and therefore the other kinds will not be again referred to. The most hurtful recorded in Britain is one that has proved destructive to Potatoes in Ireland and in Scotland; and it has also been injurious in Norway. The plants become covered with a thick felt of mycelium all over the diseased parts; and amidst this are formed masses of compact tissue (sclerotia), at first pale, then becoming dark. Some of these masses are as large as a small bean, but few exceed a small pea in size. In a short time, the host-plant perishes, but the Fungus goes on to perfect its sclerotia. From each of these, in the summer, there grow two or three cups. When fully grown, these are nearly flat, and about ⅛in. or ¼in. across, and they are supported on a slender, wavy stalk, from 2in. to 4in. long. Messrs. Berkeley and A. S. Wilson have named it *P. postuma*, but it seems very closely allied to *P. sclerotiorum*, Lib., and *P. ciboroides*, Fr. (see Fig. 99); and it is doubtful whether they are really

FIG. 99. PEZIZA CIBOROIDES (enlarged)—*b*, Cups; *c*, Stalks; *sc*, Portion of Tissue of Sclerotium.

distinct species. *P. sclerotiorum* causes disease in Turnips and Cabbages in Germany, forming sclerotia

Peziza—*continued.*

in the stems between the surface-layer and the wood. The infested plants ought to be burned, to prevent the spread of the disease, and this should be done early in the season, before the sclerotia have fallen to the soil. The structure of *P. postuma* is shown in Fig. 98.

Another *Peziza* of some importance is *P. Willkommii*, which grows on resinous swellings upon the branches of Larch. The cups are sessile, or shortly stalked, hairy, and pale outside, orange inside, and are about ⅛in. in breadth. This Fungus is sometimes referred to *P. calycina* as a variety. The diseased branches gradually wither and, in time, the tree is destroyed. Some writers believe that the Fungus does not originate disease, but only settles on punctures made by Aphides. In any case, the dying branches should be burned, to prevent the spread of the disease to other trees.

PFAFFIA (named in honour of C. H. Pfaff, 1774-1852, Professor of Chemistry at Kiel). ORD. *Amaranthaceæ*. A genus comprising about fifteen species of slender, erect, stove herbs, natives of Brazil. Flowers in dense spikes or heads; perianth five-parted, with subequal segments. Leaves opposite, sessile or nearly so, entire. For culture of *P. gnaphaloides*, the only species introduced, *see* **Celosia.**

P. gnaphaloides (Gnaphalium-like). *fl.* white, disposed in solitary heads, on slender peduncles, 7in. to 15in. long. June. *l.* ten to fifteen lines long, two to four lines broad, almost erect, soft; lower ones oblong or oblong-ovate, obtuse, slightly mucronulate; upper ones narrow-linear. *h.* 1ft. 1822. Perennial.

PFEIFFERA. Included under **Rhipsalis** (which *see*.)

PFEIFFERIA. A synonym of *Cuscuta*.

PHACA (from *Phake*, an old Greek name applied by Theophrastus to a leguminous plant). Bastard Vetch. ORD. *Leguminosæ*. A genus of hardy, herbaceous perennials, now included, by Bentham and Hooker, under **Astragalus** (which *see* for characters and culture).

P. alpina (alpine). *fl.* yellow. July. Pods compressed, half-ovate, acute, smoothish. *l.* with nine to twelve pairs of oblong, obtuse, pubescent leaflets. *h.* 1ft. Alps, &c., 1759. (F. D. 856.) The variety *dahurica* is firmer and more erect, with a harder pod.

P. bætica (Bætic). *fl.* white, the size and shape of those of *Sutherlandia*. September. Pods oblong, boat-shaped, compressed. *l.* with seven to ten pairs of ovate, mucronate leaflets, which are villous beneath. *h.* 1ft. to 2ft. South Europe, &c., 1640. (S. F. G. 727.)

P. frigida (cold). *fl.* cream-coloured. July. Pods stipitate, oblong, inflated, rather hairy. *l.* with four to six pairs of ovate-oblong, rather ciliated leaflets. Stems erect, glabrous, almost undivided. *h.* 1ft. North Europe, &c., 1795. (J. F. A. 166.)

PHACELIA (from *phakelos*, a fascicle; in allusion to the disposition of the flowers). SYNS. *Aldea*, *Eutoca*, *Microgenetes*, *Whitlavia*. ORD. *Hydrophyllaceæ*. A genus comprising fifty species of mostly hardy, annual or perennial herbs, usually scabrous-pubescent or hispid, sometimes erect, tall, and simple or branched, occasionally dwarf, diffuse, and much-branched or tufted; they are mostly natives of Western North America, Mexico, and the Chilian Andes. Flowers blue, violet, or white, disposed in terminal cymes, which are usually pedunculate or reduced to a simple raceme; calyx lobes linear, lanceolate, or oblong; corolla campanulate or sub-rotate, rarely tubular or funnel-shaped; stamens five, exserted or included. Leaves pinnately lobed or dissected, rarely undivided, deeply toothed, or entire. The species thrive in any ordinary garden soil. The perennials may be increased by divisions, and the annuals by seeds. The best-known species, some of which are rather ornamental, are described below; they are annuals, except where otherwise stated.

P. campanularia (bell-flowered).* *fl.* deep blue, with a white spot at the base of each sinus, large, broadly campanulate. *l.* stalked, roundish-oblong, crenate. *h.* 6in. to 8in. California, 1882. Plant much-branched. (B. M. 6735; G. C. n. s., xx. 135.)

Phacelia—*continued.*

P. congesta (crowded). *fl.*, corolla blue, campanulate, almost twice as long as the calyx; racemes corymbose, rather loose, almost equalling the leaves. June. *l.* 1in. to 2in. long, pinnatisect; segments one to four on both sides, unequal, the terminal one larger, and three-lobed. Stem 8in. to 15in. high, erect, flexuous. Texas, 1835. (B. M. 3452.)

P. divaricata (spreading). *fl.* light violet, sub-sessile; corolla rotate-campanulate; racemes many-flowered, elongated, unilateral, longer than the leaves, sometimes axillary, sometimes opposite the leaves. May. *l.* alternate, petiolate, ovate or oblong, entire, slightly obtuse, 1in. to 3in. long. Stems dichotomously divaricating, fragile, decumbent. California, 1833. (B. M. 3706 and B. R. 1784, under name of *Eutoca divaricata*.)

P. d. Wrangeliana (Wrangel's). A variety with sometimes three-lobed, radical leaves. (S. B. F. G. ser. ii. 362, under name of *Eutoca Wrangeliana*.)

P. Franklinii (Franklin's). *fl.* blue, sub-sessile; corolla spreading-campanulate; racemes spike-formed, short. May. *l.* 1in. to 3in. long; radical ones clustered, cauline ones alternate, all lanceolate, pinnate-parted; lobes seven to ten, oblong, entire or irregularly two to five-lobed. Stem 6in. to 10in. high. Shores of Lake Superior, &c., 1827. (B. M. 2985, under name of *Eutoca Franklinii*.)

P. grandiflora (large-flowered). *fl.* light violet-purple, sub-sessile; corolla 1in. to 1½in. in diameter; racemes circinate at apex. Early summer. *l.* broadly ovate, 1½in. long, dentate, sub-cordate at base, wrinkled, and, as well as the stem and calyx, hispid. *h.* 5ft. California. (B. M. 5029, under name of *Cosmanthus grandiflorus*.)

P. Menziesii (Menzies'). *fl.* purple, sub-sessile; corolla ½in. to ¾in. in diameter, spreading-campanulate, twice as long as the calyx. June. *l.* hispid, linear, entire, trifid, or pinnatifid, with few, unequal, oblong or linear lobes. Stem erect. *h.* 1ft. North-west America, 1826. (B. M. 3762 and S. B. F. G. ser. ii. 334, under name of *Eutoca Menziesii*; B. R. 1180, under name of *E. multiflora*.)

P. Parryi (Dr. Parry's). *fl.* dark violet-blue; corolla 1in. in diameter, almost rotate; tube very short; limb expanded, with rounded lobes; cymes many-flowered, exceeding the leaves. Summer. *l.* stalked, ovate or ovate-oblong, hairy on both surfaces; petiole 2in. to 4in. long. *h.* 6in. to 12in. Southern California. A viscid annual. (B. M. 6842.)

P. sericea (silky). *fl.* bluish-purple; corolla sub-campanulate, as long as the calyx; racemes spike-formed, compound, terminal, much longer than the leaves, dense-flowered. June. *l.*, lower ones approximating pinnatifid, silky on both sides, the lower lobes lanceolate, extrorse incised; upper leaves entire, linear. Stem 10in. high. Rocky Mountains, 1827. Perennial. (B. M. 3003, under name of *Eutoca sericea*.)

P. tanacetifolia (Tansy-leaved). *fl.* bluish-pink; corolla rather longer than the calyx, campanulate; racemes spike-formed, elongated, dense-flowered, corymbose. June. *l.* pinnatisect, 2in. to 6in. long; segments three to seven each side, with a terminal one, oblong, unequally cut-toothed, the lobes or teeth ovate, acute. Stem sub-erect. *h.* 2ft. California, 1832. This species is frequently grown as a bee plant. (B. M. 3703; B. R. 1696; S. B. F. G. ser. ii. 360.)

FIG. 100. PHACELIA VISCIDA, showing Habit and detached Flowering Branchlet.

P. viscida (viscid).* *fl.* blue, purplish; corolla about ¾in. broad; racemes opposite the leaves, erect, many-flowered, 4in. to 8in. long. July. *l.* broadly ovate, 1½in. to 3in. long, shortly petiolate, sub-cordate, angulate, serrate; upper ones deeply or simply

Phacelia—*continued.*

toothed. Stem erect, 1ft. high, branched. California, 1834. Plant glandular, pilose, viscous. See Fig. 100. (B. M. 3572, under name of *Eutoca viscosa*; B. R. 1808 and S. B. F. G. ser. ii. 368, under name of *E. viscida*.)

P. Whitlavia (Whitlavia).* *fl.* large, in terminal, many-flowered racemes; calyx deeply cut to the base; corolla rich blue, with an ample tube and a nearly equal limb of five spreading lobes. June. *l.* alternate, nearly deltoid or ovate-deltoid, coarsely and doubly serrated, hairy-pubescent; petioles generally longer than the leaves. *h.* 2ft. California, 1854. (B. M. 4813.)

PHAEDON BETULÆ (Mustard Beetle). This beetle is about ⅛in. long, oval, of a glossy violet or brilliant blue, sometimes greenish; the head and thorax are minutely punctate; wing-cases punctate-striate; lower surfaces of body, legs, and antennæ black. The eggs are laid on the backs of the leaves. The larvæ are flattened. The body is broadest about the fifth segment, and tapers slightly to each end. It is of a smoky-yellow colour, spotted with black; the head is black. Each segment is prolonged at the sides into a conical protuberance. There are a few scattered hairs on the body. The insects are believed to pupate in the soil. There are two broods in the year, and the beetles that emerge in autumn hybernate. In "Farm Insects," p. 104, Mr. Curtis attributes to this species damage done to Turnips; and, in 1881, Mr. Fryer drew attention to it as destructive to Mustard and Cabbages. In Ormerod's "Report" for 1882, pp. 74-76, there is an account of the ravages of these insects in the Fen District of England, especially around Whittlesea, where the beetles prove so destructive to cultivated Mustards, Cress, Rape, and Cole, "that, in six or seven days, they will completely destroy a field of twelve acres, and leave nothing but the bare stalks." To garden produce of the same sort, they are also very hurtful. They are common in most parts of Britain, frequenting plants of various kinds in damp places; and, possibly, it will be found that they are dangerous to farm and garden produce only in damp districts, like the Fens in England.

Remedies. Burning stubble, and rubbish of all kinds, is one means of destroying many of the beetles in their winter retreats. A change of crop for a year or two is recommended, with a view of starving out the insects; but, since they are common on Brooklime, Bittercress, and other plants inhabiting damp localities, this method can hardly be fully successful, except under special conditions. Probably, dressings such as have been found useful in attacks of a similar kind by other insects on Turnips, &c., would be found useful, *e.g.*, gas lime, soot, or sulphur, scattered alone or mixed, while the dew is on the plants, or after a shower. Probably, hand-picking would suffice to protect garden produce from serious injury. Anything that promotes vigorous, healthy growth is of much value in enabling the plants to resist injury from the attacks of the larvæ.

PHÆDRANASSA (from *phaidros*, gay, and *anassa*, a queen; alluding to the beauty of the flowers). Queen Lily. Including *Leperiza* (in part). ORD. *Amaryllideæ*. A genus comprising about six species of stove, greenhouse, or half-hardy bulbous plants, natives of the Andes of South America. Flowers showy, umbellate, reflexed; perianth greenish-red or two-coloured, narrow funnel-shaped or nearly cylindrical, the lobes long, narrow, and connivent, shortly spreading at the apex; involucral bracts two, or rarely three, narrow-linear; scape fistular. Leaves petiolate, narrow or rather broadly oblong. The species thrive best in a strong, yellow loam; when under greenhouse treatment, they should be kept comparatively dry during the winter months. The most suitable situation for them in the open air is under a south wall. Propagated by offsets.

P. Carmioli (Carmiol's).* *fl.* bright red, tipped with green, six to eight, drooping, about 2in. long; scape about 2ft. high. *l.* erect, lanceolate, as long as the scape, including the stalk. Costa Rica, 1868. Stove. (Ref. B. 46.)

Phædranassa—*continued.*

P. chloracea (greenish-yellow). *fl.* purplish-rose, tipped with green, upwards of 2in. long, with convolute limb segments. *h.* 1½ft. Peru, 1844. Greenhouse. (B. R. 1845, 17.) *P. obtusa* is a form with more obtuse segments.

P. eucrosioides (Eucrosia-like).* *fl.* drooping, about 1in. long, with a green tube and red segments; umbel three or four-flowered; scape terete, 12in. to 15in. long. *l.* one or two, petioled, oblong, acute, developing after the flowers. Ecuador, 1878. Stove. SYN. *Leperiza eucrosioides*.

P. Lehmanni (Lehmann's).* *fl.* scarlet, nodding, three in a pedunculate umbel; perianth tubular, 1in. long, with shortly spreading tips; stamens much exserted. *l.* solitary, stalked, elliptic-lanceolate, acute, dark green above, glaucous beneath. Columbia, 1884. Stove. (R. G. 1138.)

P. obtusa (blunt). A form of *P. chloracea*.

P. rubro-viridis (red and green).* *fl.*, perianth 1¼in. long; segments pale on the borders, keeled with green in the upper quarter, the rest with bright red; pedicels and spathe ½in. to ¾in. long; scape slender, bearing a few-flowered umbel. April. *l.* bright green, rather fleshy, acuminate, 1ft. or more long, three to four lines broad. Andes. Greenhouse. The correct name of this plant is *Eustephia coccinea*.

P. schizantha (cut-flowered). *fl.* contemporary with the leaves; perianth tube green, very short; segments bright red, shading off to salmon-colour at the tips, connivent, nearly 1½in. long. October. Pasto, Columbia, 1800. Stove or greenhouse.

P. viridiflora (green-flowered). *fl.* greenish-yellow, nodding, narrow-funnel-shaped, about four in an umbel; scape terete, 1ft. long. *l.* lanceolate, under 1ft. long, about 1½in. broad, bright green. 1877. Greenhouse.

PHÆNOCODON. A synonym of **Lapageria** (which *see*).

PHÆNOCOMA (from *phaino*, to shine, and *kome*, hair; referring to the colour and nature of the involucre). ORD. *Compositæ*. A monotypic genus. The species is a handsome, small, hard-wooded, evergreen shrub, separated from the genus *Helichrysum* by the central florets of the head being males only, and not hermaphrodite. It has a peculiar and interesting hoary appearance at all seasons of the year. The plant commences to blossom when in a small state, and remains in full beauty for nearly three months. It thrives best in good, brown, fibrous peat and coarse silver sand; proper drainage and watering are important elements in its culture. The best position for this plant in the greenhouse is one as near to the glass as possible; and, during summer and autumn, it may be kept in a cold pit, where plenty of air can be admitted on all fine days. Repotting may be done when the plants start into active growth during spring. Propagation is effected by cuttings of the young side shoots, getting firm at the base, inserted in sand over peat, in a very gentle heat.

P. prolifera (proliferous).* *fl.-heads* crimson, terminal, large, solitary; involucre of many rows of scales, the outer of which are short and appressed, and the inner long, radiating, shiny, and of a handsome rose-purple colour. Summer. *l.* glabrous, very small, scale-like, imbricated. *h.* 4ft. Cape of Good Hope, 1789. A variety known as *Barnesii* has its heads of a deeper crimson colour. SYNS. *Elichrysum proliferum* (B. M. 2365; B. R. 21), *Xeranthemum proliferum* (A. B. R. 374).

PHÆNOGAMOUS. A term applied to such plants as are visibly furnished with sexual organs.

PHÆNOGAMS. One of the two sub-kingdoms into which plants are divided. Phænogams, or Phanerogams, include all those plants which are provided with stamens, and ovules which, after fertilisation, become seeds containing an embryo. The two classes into which Phænogams are divided are: Dicotyledons, or Exogens, and Monocotyledons, or Endogens. Each of these classes is again sub-divided into groups, and these again into natural orders.

PHÆNOPODA. A synonym of **Podotheca** (which *see*).

PHÆNOSPERMA (from *phaino*, to shine, and *sperma*, a seed; alluding to the glistening seeds). ORD. *Gramineæ*. A monotypic genus. The species is a tall, hardy grass, thriving in any common soil. It may be increased by seeds, sown in spring.

Phænosperma—*continued.*

P. globosum (globe-seeded). *fl.* in a large panicle, with its slender branches scarcely branchleted; spikelets one-flowered; glumes four, slightly acute; style distinct; stigma plumose. *l.* flat. *h.* 6ft. China, 1874.

PHÆOSTOMA. Included under *Clarkia.*

PHAIUS (from *phaios*, shining; in allusion to the flowers). Frequently spelt *Phajus.* SYNS. *Pachyne* and *Tankervillia.* Including *Limatodes*, *Pesomeria*, and *Thunia.* ORD. *Orchideæ.* **A genus comprising about twenty-five species of tall, terrestrial or epiphytal, stove orchids, mostly tropical Asiatic, but also found in tropical Africa and the Mascarene Islands, Australia, the Pacific Islands, China, and Japan.** Flowers yellow, violet, or white, few or many in a raceme, pedicellate; sepals free, sub-equal, spreading or erect; petals similar, but narrower; lip erect, concave or cucullate, spurred at base, or curved and produced continuous with the base of the column; lateral lobes large, erect, sometimes undulated and confluent with the middle lobe at apex; middle lobe expanded, spreading or recurved, frequently undulated at apex; column rather long, sub-terete, two-angled or two-winged, clavate at apex; scapes or

FIG. 101. PHAIUS GRANDIFOLIUS.

peduncles sometimes springing from the caudex, sometimes lateral or terminal. Leaves ample or elongated, folded, narrowed at base or contracted into a long petiole; sheaths often striate. The species are of tolerably easy culture. They thrive best in a compost of loam, leaf mould, and rotten cow-dung. Plenty of heat and moisture are essential during the growing season; but when at rest, the plants may be kept rather dry and in a cooler temperature. Propagated by dividing the bulbs after flowering. *P. grandifolius* is the best known species; it may readily be grown into large specimens.

P. albus (white).* *fl.* white, showy, three or four in a terminal, drooping raceme, shorter than the leaves; sepals and petals oblong-lanceolate, acute; lip nearly 2in. across, oblong, cucullate, denticulate, rounded at apex, the disk yellow, veined with rose, five-crested. *l.* oblong-lanceolate, acute, glaucous beneath, lower ones smaller, the lowest scale-like. Stem nearly 2ft. high. Nepaul, 1836. SYN. *Thunia alba.* (B. M. 3991; B. R. xxiv. 33.)

P. Bensonæ (Mrs. Benson's).* *fl.* of a bright rosy-purple, whitish towards the centre, large and showy, from 2in. to 3in. across; lip

Phaius—*continued.*

deep rich rosy-purple, with bright yellow crests on the disk; raceme short, produced from the top of the stem. July. *l.* subdistichous, linear-lanceolate, 6in. to 10in. long, slightly glaucous beneath. Stems fascicled. Tubers nodose. *h.* 1ft. Rangoon, 1867. A beautiful plant. SYN. *Thunia Bensoniæ* (B. M. 5694).

P. Bernaysii (Bernays'). *fl.* pale yellow within, white without; lip three-lobed and white; scape from 2ft. to 3ft. high. *l.* lanceolate, plicate, dark green. *h.* 3ft. Queensland, 1873. This can only be distinguished from *P. grandifolius* by the pale yellow colour of the flower inside, and the labellum being also yellow, edged with white. (B. M. 6032, under name of *P. Blumei Bernaysii.*)

P. bicolor (two-coloured).* *fl.* 4in. in diameter; sepals and petals deep bright red-brown, linear-lanceolate; lip rose, yellow, and white, much broader, oblong, rolled round the column, much undulated at the edges, curved downwards at the upper end, at its base lengthened into a horn. *l.* 1½in. long, not tapering to a petiole, but rolled round each other. Stem naked below, covered with flowers above, 2ft. high. Rhizome fleshy, knobby, like that of an Iris. Ceylon, 1837. (B. M. 4078.)

P. Dodgsonii (Dodgson's).* *fl.* pure white, with the throat or base of the fringed lip of a pale cinnabar-red, disposed in terminal racemes. India, 1877. Probably only a fine variety of *P. albus.*

P. grandifolius (large-leaved).* *fl.* from 3in. to 4in. across; sepals and petals of a brownish colour within, and white without, lanceolate; lip convolute, white, with a dark crimson-brown throat; spikes 2ft. to 4ft. high, many-flowered, well adapted for cutting. January to March. *l.* broadly lanceolate, 2ft. to 3ft. long. *h.* 3ft. China to Australia, 1778. A noble evergreen orchid, one of the best for exhibition purposes. See Fig. 101. SYNS. *Bletia Tankervillia* (B. M. 1924), *Limodorum Tankervillæ* (A. B. R. 426). There is a handsome variety, *superbus* (F. d. S. vii. 738).

P. Humblotii (Humblot's). *fl.* rosy, with white and red blotches, large; lip spurless, having a saddle-like callus on its disk, running out in a small keel; raceme few-flowered. Madagascar, 1880. A beautiful species.

P. inquilinus (tenant). *fl.* cream-colour, the three keels of the lip being yellowish-white. 1867. A hybrid form, the parents of which are unknown.

P. irroratus (bedewed).* *fl.* large; sepals and petals rich cream-colour, tipped with rosy-pink; lip nearly round, creamy-white, stained with yellow at the base; spike erect. 1867. A very handsome form, the result of a cross between *P. grandifolius* and *Calanthe vestita.* (G. C. 1867, p. 264; G. C. n. s., xviii. 565.)

P. maculatus (spotted). *fl.* rich yellow, borne on short spikes in great profusion. Spring. *l.* long, dark green, spotted with yellow. Pseudo-bulbs large, somewhat ovate. *h.* 2ft. India, 1823. A showy and desirable plant, not often seen in cultivation. (B. M. 3960; L. B. C. 1803.) SYN. *Bletia Woodfordii* (B. M. 2719).

P. Marshallіæ (Mrs. Marshall's).* *fl.* white, large; lip marked on the upper part with a little yellow, the lower part beautifully fringed. June. *h.* 2ft. Moulmein, 1871. A lovely plant, well suited for exhibition purposes, and continuing to throw fresh blossoms for a long time. SYN. *Thunia Marshalliæ.*

P. tetragonus (tetragonal). *fl.* reddish-brown internally, and greenish externally; sepals and petals similar in shape, &c.; lip yellow, streaked with orange-red, undivided, cucullate, parallel with, and partly surrounding the column, with the lower part of which it is adnate, and forms a slight protuberance at the bottom; peduncles lateral, bearing a loose spike of eight to ten rather large blossoms. Winter. *l.* broad, membranous, long-pointed. Stems sharply four-angled, jointed, 1ft. or more high. Mauritius, 1837. (B. M. 4442, under name of *Pesomeria tetragona.*)

P. tuberculosus (tubercled).* *fl.* snow-white; lip very fine, funnel-shaped below, with wide, yellowish lateral lobes, covered over and over with brown blotches, on an anterior, obcordate, wavy, middle lacinia, white, with mauve marginal spots; spikes four to six-flowered, erect. Spring. *l.* oblong, plicate, 1ft. long. Stem slender and twisted. Madagascar, 1881. (Gn., July 19, 1884; G. C. n. s., xviii. 565.)

P. Wallichii (Dr. Wallich's).* *fl.* orange-yellow, or buff tinged with purple, from 4in. to 5in. across; lip yellow, with a brown throat; spikes tall, upright, 3ft. to 5ft. high. March to May. *h.* 4ft. to 5ft. Khasya Hills, India, 1837. A vigorous-growing plant, similar in habit to *P. grandifolius.*

PHAJUS. *See* **Phaius.**

PHALACRÆA. Included under **Piqueria** (which *see*).

PHALACROLOMA. Included under *Erigeron.*

PHALACROMESUS. A synonym of **Tessaria** (which *see*).

PHALÆNOPSIS (from *phalaina*, a moth, and *opsis*, resemblance; referring to the appearance of the flowers). Moth Orchid. Including *Polychilos.* ORD. *Orchideæ.* A genus comprising about a score species of very handsome stove, epiphytal orchids, having short, leafy stems instead of pseudo-bulbs, natives of the Malayan Archipelago and the Eastern provinces of India. Flowers showy, loosely

Phalænopsis—*continued.*

racemose, shortly pedicellate; sepals and petals flatly spreading, the latter much larger and wider than the former; lip three-lobed, free, continuous with the prolonged base of the column, and furnished with a callosity at its base; column semi-terete, thickened upwards; anther two-celled, containing two pollen masses, attached by a strap-shaped caudicle to a cordate gland; peduncles lateral, simple or branched. Leaves few, broad, thick, leathery, two-ranked, notched at the top. Some of the plants described below as species are probably natural hybrids.

The species of *Phalænopsis* rank among the most beautiful of the numerous Orchids in cultivation. One or another of the representatives of the genus may be seen in flower nearly the whole year round. The plants require careful treatment, and the heat of a house devoted to East Indian Orchids. In nurseries and a few private gardens, where a large collection or quantity of these plants are grown, it is customary to devote structures specially to them; this is most satisfactory, where practicable, as the proper treatment can be more readily given than would be the case if other plants were intermixed. Where, however, there is not an orchid-house in existence, a few specimens of *Phalænopsis* may, with extra attention, be successfully cultivated in an ordinary stove. It is important to remember that the plants are natives of hot countries, where they are deluged with water in the rainy season. They are found growing on rocks, and on branches of trees, in damp places. Not having any pseudo-bulbs in which nutriment and moisture may be stored, and the evaporating leaf surface being somewhat great, it is essential that, in the growing season, plenty of water must be given, and sufficient moisture provided at all times, according to weather, to prevent the plants suffering for want of it. The growing season is from March until October, inclusive. During this interval, the minimum day temperature should be from 70deg. to 75deg., allowing a rise to 80deg. or more with sun heat; the night temperature being about 65deg. In winter, 60deg. to 65deg. should be taken as a minimum. Established plants of Phalænopsids require plenty of light, but they must not be exposed to the summer's sun. If this is allowed, the foliage is liable to become scorched and disfigured, and injury to the plant will also ensue. A thin, movable shading, that can easily be applied or removed, should be provided. It is most usual to suspend the plants from the roof; but they should not be hung too near, on account of their liability to injury from cold. If grown in pots or cylinder baskets, they should be arranged on a bed or stage near the glass.

Phalænopsids may, under judicious treatment, be successfully grown in pots, in baskets, or on blocks. Drainage is of the utmost importance: epiphytal Orchids are quite unable to withstand anything approaching stagnant moisture. Clean potsherds, broken about ½in. square, should be used in pots or baskets, so as to fill nearly up to the rim; or a small, inverted pot may be placed inside for assisting in the drainage. Good sphagnum, with a few pieces of fibrous peat and nodules of charcoal, should be placed in sufficient quantity above the drainage to allow the plant to rest on it at a height, in the centre, of 3in. above the rim or edge. The surface should be covered, after the plant is fixed in position, with living sphagnum. Careful shading and watering will be requisite for some time afterwards.

Phalænopsis—*continued.*

The shallow pots or pans specially made for Orchids are well adapted for species of *Phalænopsis*. They can be readily suspended or taken down, and always present a neat appearance when in use. If grown on blocks, a little peat and sphagnum should be placed beneath the plant, which should then be surrounded with sphagnum, and fixed in position with a small piece of wire. An important point in management is that of ventilation. Air should be admitted in summer whenever it may be done with safety; but the ventilators should be placed near the pipes, so that the air may become warmed before reaching the plants. Damping of the stage and floor, on bright days, should be performed chiefly in the morning, so that it may become nearly dried up by night; and drip must be carefully guarded against. To keep the foliage clean, and remove Thrips, which are often troublesome, the leaves should be carefully sponged occasionally with clean, tepid water. Should fumigating become a necessity, it must be conducted with very great care.

Propagation is very difficult, as the plants seldom afford an opportunity for division. *P. Luddemanniana* is more easily increased than any of the others; it produces young plants upon the flower stems. Occasionally, some of the other species will also similarly multiply; and *P. Stuartiana* sometimes produces young plants upon its roots. When this takes place, these young plants should be left until they form roots of their own, when they may be placed separately on small blocks.

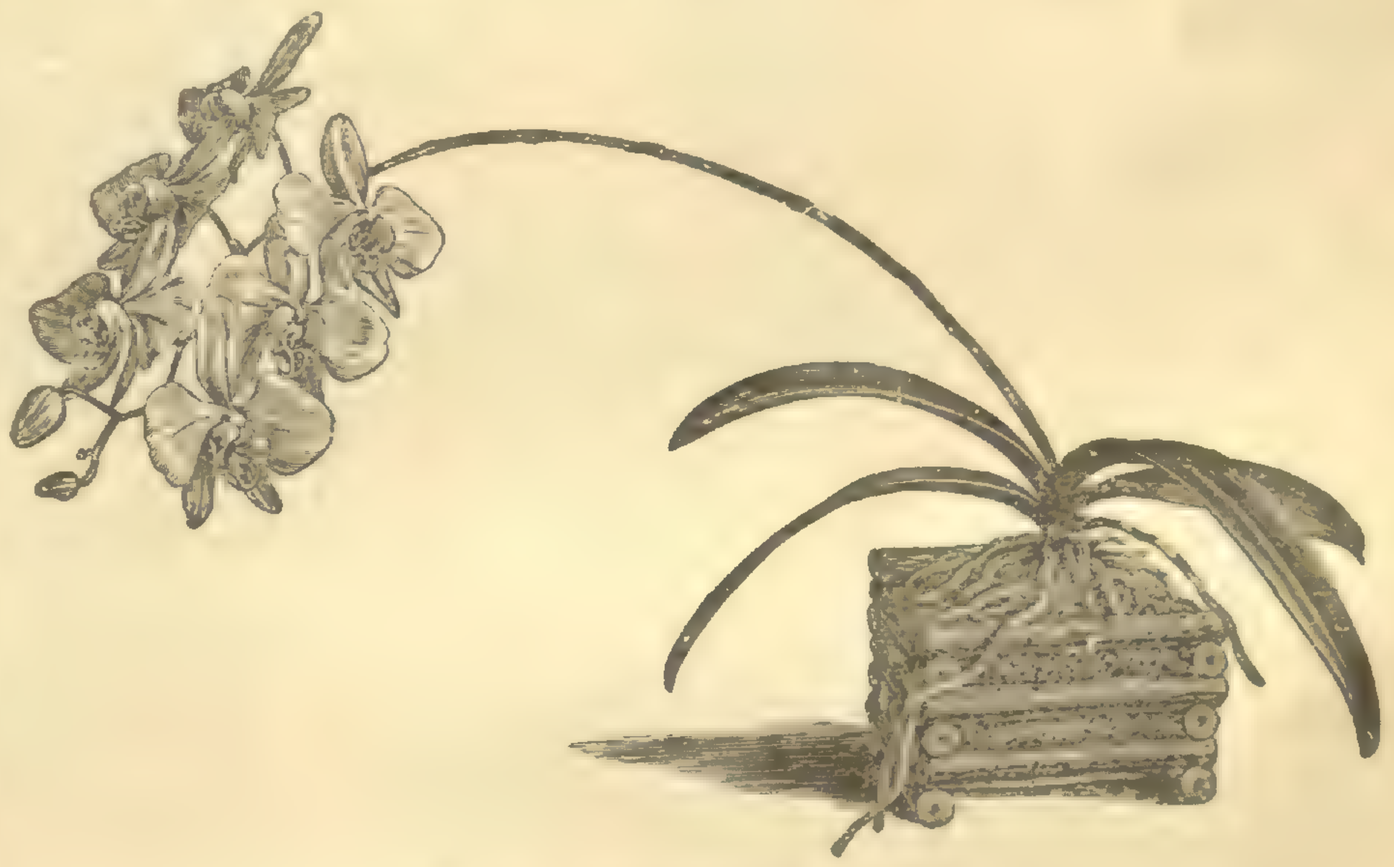


FIG. 102. PHALÆNOPSIS AMABILIS.

P. amabilis (lovely).* *fl.* varying considerably in size, sometimes exceeding 5in. in diameter; sepals and petals pure white and rounded, of great substance; lip having a few bright yellow streaks; panicle usually very fine, and branching. Autumn. *l.* light green. Java, 1847. A remarkably handsome species, closely allied to *P. Aphrodite*, and distinguished chiefly by the larger flowers, colour of the lip, and in the longer and lighter green shade of the leaves. See Fig. 102. (B. M. 5184, under name of *P. grandiflora*.) A variety named *aurea* has the colouring of the lip much darker and richer than usual.

P. amethystina (amethyst).* *fl.* comparatively small, loose; sepals and petals white, spreading; lip white, tinged with yellow at the base, centre part rich amethyst, suffused with purple, and deeply emarginate in front; peduncle simple or branched, 4in. to 12in. long, slender at the base, thicker towards the apex; bracts small, pointed. *l.* stout, rigid, oblong, 3in. to 4in. long, 2in. to 2½in. broad, margins undulate. Sunda Isles (?), 1869. An elegant but small-growing species. (G. C. 1870, 1731.)

P. antennifera (antennæ-bearing). *fl.* rose-coloured, in a spike 2ft. long, having small, spreading, linear, side lobes to the stalk of the lip; these, and the basal antennæ, are deep orange, the front lobe purple. Burmah, 1879. This plant much resembles *P. Esmeralda*.

P. Aphrodite (Aphrodite).* *fl.* about 3in. across; sepals and

Phalænopsis—*continued.*

petals pure white, the latter larger and more rounded than the former; lip three-lobed, white, frequently marked with a few streaks of crimson, orange, and yellow; racemes long, branched, and having the blossoms arranged in a distichous manner. Flowering nearly all the year round. *l.* bright green, elliptical, broad, thick, flat, arranged very close together in a two-ranked manner. Manilla, 1836. A beautiful species, remaining a long time in perfection if the flowers are kept free from damp. (B. 133; B. M. 4297; B. R. 1838, 34, under name of *P. amabilis*.) There are several very desirable forms of this plant.

P. Boxallii (Boxall's). *fl.*, sepals and petals sulphur-coloured, the former barred and blotched with brown, and the latter with three longitudinal stripes; front lobe of lip white, crescent-shaped, with blunt angles and a central tubercle; lateral lobes erect; disk with a short, bicuspate, yellow lobe, with a mauve and white keel in front. Philippines, 1883.

P. casta (chaste). *fl.* white, slightly tinged with purple. *l.* slightly spotted in the young state only. Philippines, 1875. This is supposed, by Reichenbach, to be a natural mule.

P. Corningiana (Corning's). *fl.*, upper sepal striped and barred with purple-brown; lateral ones almost wholly purple-brown, with border and a few spots yellowish-white; petals longitudinally striped and blotched; lip bent immediately before its claw with a yellow callus, and the central part rich purple-violet; a tuft of hairs on the front middle line. 1879. A very striking plant, somewhat resembling *P. sumatrana*.

P. Cornu-cervi (stag's horn). *fl.* of medium size; sepals and petals yellow, tinged with green, and barred and striped with brown; spike thickened and flattened at the top where the flowers are situated. *l.* bright green, 8in. or more in length. Moulmein, 1864. A very pretty species, allied to *P. Mannii*. (B. M. 5570, under name of *Polychilos Cornu-cervi*.)

FIG. 103. PHALÆNOPSIS ESMERALDA.

P. Esmeralda (Esmeralda).* *fl.* rose coloured, 1in. in diameter; lateral lobes of lip oblong, erect; middle lobe obtuse, decurved; raceme few-flowered; scape 1ft. high. *l.* distichous, spreading, 8in. long, 2in. broad, somewhat granulose, marbled. Cochin China, 1877. A small but pretty species. See Fig. 103. (F. M. n. s. 358.)

P. fuscata (dusky). *fl.* yellowish, mottled with brown, medium-sized, very fleshy; lip very peculiar. *l.* large, oblong, bluntly acute. Malaya, 1874. Similar to *P. Cornu-cervi*.

Phalænopsis—*continued.*

P. intermedia (intermediate). *fl.* of moderate size; sepals and petals white, shaded with rose; lip small, of a deep rosy-purple hue. *l.* light green. Philippines, 1867. A very desirable natural hybrid, although not so showy as many others; it has also been recently artificially produced by Messrs. Veitch. It has two extremely pretty varieties: *Brymeriana* (F. M. n. s. 263) is chiefly distinguishable by the lip being white and marked with crimson; *Portei* (G. C. n. s., v. 369, 371) surpasses the typical species in the fine, branching spikes bearing more numerous, larger flowers, the colouring being similar, but the contrast of tint between the lip and other portion of the flower being more distinctly marked. Both type and varieties are very rare.

P. leucorhoda (white-and-rose). *fl.*, sepals and petals white, tinged in the centre with rose; column rose. Philippines, 1875. A handsome and distinct form, supposed to be a natural hybrid between *P. amabilis* and *P. Schilleriana*.

P. Lowii (Low's). *fl.* comparatively small; sepals and petals white, tinged with rose, round; lip bright rosy-purple. *l.* broad, somewhat thin in texture, dark green. Borneo, 1862. A very remarkable species, said to grow upon exposed rocks in Moulmein, where, at one time of the year, the rains are extremely heavy, and, at another, the heat and drought are so great that the plant loses its leaves and appears to be almost dead, but revives with the return of the wet season. (B. M. 5351.)

P. Luddemanniana (Luddemann's).* *fl.* medium-sized; sepals and petals white, transversely barred with brown towards the points, the lower portion being barred with violet-purple; lip rather long, having its centre richly marked with deep violet; spikes sometimes exceeding 2ft. long, and remaining in beauty for two months. *l.* bright green, 8in. or more in length. Philippine Islands, 1865. Very distinct and beautiful; much more easily increased than the other species of the genus. (B. M. 5523.)

P. L. pulchra (pretty). *fl.* beautiful port-wine colour; lower part of petals, sepals, and lip, and base of column, shining amethyst-blue. Philippine Islands, 1875.

P. Mannii (Mann's). *fl.* about 2in. broad; sepals and petals yellow, with many cinnamon-brown dots and blotches; lip three-lobed, the lateral lobes erect, the central one lunate and fringed, white and purplish; column yellow; peduncle several-flowered. *l.* cuneate-oblong, ligulate, acute, green, with a delicate violet border and many violet spots on the base. India, 1871.

P. Mariæ (Mrs. Mary Burbidge's). *fl.* moderate-sized; sepals and petals white, with transverse blotches of chocolate-red and one or two magenta-purple spots at their base; lip rich magenta-purple, with a white edge. *l.* oblong, dark green, distichous, drooping. Borneo (?), 1883. (W. O. A. 80.)

P. Parishii (Parish's).* *fl.* cream-coloured, except the lip, which is purple, diminutive, disposed in short spikes. *l.* oblong-ligulate, rather blunt. Burmah, 1865. A curious little epiphyte. (B. M. 5815.) The variety *Lobbii* has a white lip with two brown bands. 1870.

P. Reichenbachiana (Reichenbach's).* *fl.* large, disposed in many-flowered racemes; sepals and petals waxy whitish-green, with brown markings; side lobes of the lip orange and white, the central lobe mauve-blue. 1883. A fine species.

P. rosea (rosy). *fl.* rather small; sepals and petals white, slightly tinged with pink; lip deep violet in the centre, the side lobes stained with rich orange; spikes sometimes fourteen-flowered, eventually elongated. *l.* somewhat oblong, slightly broadest at the apex, bright green. Manilla, 1848. A pretty species. (B. M. 5212.)

P. Sanderiana (Sander's).* *fl.* of various rosy tints, large; lip white with brown and purple stripes, and some yellow. *l.* mottled. 1883. A fine plant. (W. O. A. 209.)

P. S. marmorata (marbled). *fl.*, sepals and petals yellowish-white outside, the lateral ones with rows of small, purple spots at their base; lip marked with purple spots and stains.

P. Schilleriana (Schiller's).* *fl.* often measuring more than 2½in. across, arranged in two rows along the spike; the rounded petals and narrower sepals of a fine rosy colour, varying in intensity in different plants; lip three-lobed, the lateral lobes rose-coloured, the central one white, with yellow protuberances at the base; peduncle frequently 3ft. in length, branched, occasionally bearing nearly 100 blossoms. *l.* arranged in a similar manner to those of *P. Aphrodite*, but much longer and broader, marbled or mottled with light green on a rich green ground. Roots remarkable in being flat, and having a rough appearance. Manilla, 1860. A very beautiful species, the best yet in cultivation, and equally attractive when in or out of flower. See Fig. 104. (B. M. 5530; R. X. O. 101.)

P. S. immaculata (immaculate). *fl.* rosy-tinted, without dot or blotch; lateral laciniæ of lip pure white, edged with violet, the callus pure yellow. Philippine Islands, 1875.

P. speciosa (showy).* *fl.*, sepals and petals white, blotched and striped with rose-madder, lanceolate, acuminate; lip clavate, papillose at the apex, with small, basal, erect side lobes, rosy-purple, with two yellow spots on the side lobes. 1883. Of this handsome plant, the following are varieties: *Christiana*, with broader sepals and petals, the former rose-madder, the latter white (G. C. n. s., xviii. 131); *imperatrix*, a larger form, with rose-purple flowers.

Phalænopsis—*continued.*

P. Stobartiana (Stobart's). *fl.*, sepals and petals apple green, ultimately yellowish-green; lip amethyst-colour, the lateral partitions marked with yellow and white, the amethyst-colour finally changing into a nearly cinnabarine-red. 1877. Allied to *P. amethystina.*

P. Stuartiana (Mr. Stuart-Low's).* *fl.* cream-coloured; the sepals are outside of a light sulphur, and inside the inferior halves of the lateral sepals of the same colour, with dark cinnamon blotches; side laciniæ of the lip pure white at the top; panicle many-flowered. *l.* broad ovate, spotted when young. 1881. A lovely species. (B. M. 6222; F. & P. 559; G. C. n. s., xvi., pp. 748, 751; R. G. 1130.)

P. sumatrana (Sumatran). *fl.* about 3in. wide; sepals and petals yellowish-white, branded or barred with streaks of reddish-brown; lip white, spotted with orange, and streaked down the centre with violet; spike about 6in. long, from five to ten-flowered. *l.* acuminated, 6in. to 7in. long, somewhat fleshy, bright green. Sumatra, 1865. (B. M. 5527.)

P. s. sanguinea (bloody). A fine variety, having the lateral sepals nearly wholly dark red, with very few yellowish-green markings. *Borneo*, 1881.

FIG. 104. PHALÆNOPSIS SCHILLERIANA.

P. tetraspis (four-horned). *fl.* white, disposed in a rich panicle; lateral lobes of lip ligulate, with a tooth at the upper end, and a conical callus in the middle, between the lobes two pairs of bristle-like processes; front lobe of lip rhomboid-ligulate, with a cushion of hairs at the apex. *l.* very fine. East Indies, 1881.

P. Valentini (Valentine's). *fl.*, sepals and petals purple, white inside at the base, and having some purple bands; lip mauve, white, and yellow. 1883.

P. Veitchiana (Veitch's).* *fl.* resembling those of *P. Schilleriana*, but smaller, purplish; lip purplish-white, with dark purple spots. *l.* cuneate-oblong, obscurely tessellated. Philippine Islands (?), 1872. (F. M. n. s. 213.)

P. V. brachyodon (short-toothed). *fl.*, sepals and petals white, the base of the lateral sepals having some brown spots; front lobe of lip dark purple, side lobes with purple tips. 1884.

P. violacea (violet).* *fl.* rather closely set along the spike, almost from its base, fully 2in. across; sepals and petals white, delicately washed with violet-rose in the lower or basal portions; lip rich violet-crimson, relieved by the golden-yellow callus; column violet-crimson. *l.* light cheerful green, as large as those of *P. Schilleriana.* 1861. A handsome species. (F. M. 1879, 342.) The variety *Murtoniana* (G. C. n. s., xvi. 145) is very desirable; it has fine lemon-yellow flowers, marked with a purplish colour.

PHALANGES. Stamens joined by their filaments, or arranged in bundles.

PHALANGIUM. A synonym of *Anthericum.*

PHALARIS (the old Greek name used by Dioscorides). ORD. *Gramineæ.* A genus comprising nine or ten species of annual or perennial, greenhouse or hardy grasses, mostly found in the Mediterranean region and extra-tropical America, a few being natives of Africa and Australia. Inflorescence in spike-like or capituliform panicles; the spikelets with one perfect flower, and generally the rudiments of two imperfect ones, which latter form minute scales between the outer, empty glumes; glumes usually six. Leaves flat. The under-mentioned hardy species are of easy culture in common garden soil. Propagated by seeds, or by divisions of the plant.

P. arundinacea (Reed-like).* *fl.*, panicle erect, loose, about 6in. long, tinged with purple. July. *l.* lanceolate, striated, smooth. *h.* 3ft. to 5ft. North temperate and Arctic regions (Britain). Perennial. (Sy. En. B. 1697, under name of *Digraphis arundinacea.*)

P. a. variegata (variegated). Gardener's Garters; Lady's Garters; Ribbon Grass. A form with striped leaves very common in gardens. *P. gigantea* is a stouter and taller-growing form.

P. canariensis. Canary Grass. *fl.*, panicle erect, ovate, close, compound, resembling an ovate spike, beautifully variegated with green and white. July. *l.* flat, lanceolate, upper sheaths inflated. *h.* 1½ft. South Europe, North Africa, West Asia. Annual. This species supplies the well-known "canary seed," so much employed as food for singing cage-birds. (Sy. En. B. 1698.)

PHALERIA (from *phaleros*, shining white; alluding to the colour of the flowers). SYN. *Drimyspermum.* ORD. *Thymeleaceæ.* A genus comprising about eight species of stove or greenhouse trees or shrubs, natives of Ceylon, the Malayan Archipelago, and Australia. Flowers sessile, in terminal, or rarely lateral, usually numerous heads; perianth tube cylindrical elongated; lobes four or five, rarely six, spreading; bracts leafy. Leaves opposite. *P. laurifolia*, the only species introduced, thrives in a compost of rich, light loam and fibry peat. It may be propagated by seeds, sown on a hotbed, in spring; or by cuttings of the young shoots, inserted in sand, under a bell glass, in bottom heat.

P. laurifolia (Laurel-leaved). *fl.* white, disposed in terminal, many-flowered heads; peduncles two lines long, scaly-bracted. *l.* shortly stalked, oblong or elliptic-oblong, 3in. to 5in. long, 1in. to 1½in. broad, slightly acuminate at both ends, glabrous. *h.* 6ft. Ceylon, 1869. Stove shrub, remarkable for the delicious Daphne-like scent of the flowers. (B. M. 5787.)

PHALLARIA. A synonym of **Plectronia** (which *see*).

PHALLOCALLIS PLUMBEA. A synonym of *Cypella plumbea.*

PHANEROGAMOUS. The same as **Phænogamous** (which *see*).

PHANEROPHLEBIA. Included under *Aspidium.*

PHARBITIS. Included under **Ipomœa** (which *see*).

PHARIUM. A synonym of *Bessera.*

PHARNACEUM (named after Pharnaces, King of Pontus, who lived contemporary with Cæsar and Pompey). SYN. *Ginginsia.* ORD. *Ficoideæ.* A genus comprising about sixteen species of annual or perennial, low, erect or decumbent, greenhouse, South African herbs, often suffrutescent at base. Flowers greenish or purplish, in axillary, racemiform, umbelliform, or compound or terminal-pedunculate cymes. Capsule membranous. Leaves alternate or pseudo-verticillate, linear, acicular, obovate, or spathulate, often setiferous at base. The species possess little beauty, and are more suited to botanical than to horticultural collections. Those mentioned below thrive in a compost of sandy loam and peat, and cuttings root readily in the same kind of soil, if placed under a glass.

P. incanum (hoary). *fl.* white inside, green without, disposed in proliferous umbels; common peduncles very long. May to October. *l.* scattered, or four in a whorl, with bundles of smaller leaves rising from the axillæ, smooth, linear; stipules pilose. Stems erect; branches white from stipules. *h.* 6in. 1782. Shrubby. (B. M. 1883.)

P. lineare (linear). *fl.* reddish, in panicled, terminal and lateral umbels. May and June. *l.* linear, obtuse, six to eight in a whorl. Stems prostrate; branches dichotomous. 1795. Shrubby. (A. B. R. 326.)

PHARUS (from *pharos*, a covering; the leaves are used for thatching and other purposes). ORD. *Gramineæ*. A genus comprising about five species (which, however, are closely related) of stove grasses, natives of tropical America, from Brazil to Mexico and Florida. Flowers in a large, terminal, loosely compound panicle, with elongated, slender, often divided branchlets; spikelets unisexual, monœcious, one-flowered, the females two or three times longer than the males. Leaves long-stalked, ample, acuminated, oblique; petioles twisted, often reversed. *P. latifolius*, the only species introduced, requires culture similar to **Bambusa** (which *see*).

P. latifolius (broad-leaved). *fl.*, fertile glume little longer than the sterile pair, villous to the base; female spikelets nearly ½in. long. July. *l.* obovate-oblong or elliptic-oblong, cuspidate, scabrous beneath, 6in. to 8in. long, 1½in. to 2½in. broad. *h.* 1½ft. to 3ft. Jamaica, 1796.

P. l. vittatus (banded).* A finely variegated form, with foliage banded with white or flushed with rose. (F. d. S. 316, under name of *P. vittatus*.)

PHASEOLUS (the old Greek name used by Dioscorides, probably from *phaselus*, a little boat; referring to a supposed resemblance in the pods). Kidney Bean. ORD. *Leguminosæ*. A rather extensive genus (about sixty species) of twining, prostrate, or short and erect, stove, greenhouse, or hardy, annual or perennial herbs, rarely woody at base, broadly dispersed over the warmer regions of the globe. Flowers white, yellow, red, violet, or purplish, fasciculately racemose on knot-like protuberances above the middle of the axillary peduncles; upper calyx lobes or teeth connate or free; standard orbiculate; wings obovate or rarely oblong; keel linear or obovate, terminating in a long, spirally-twisted point. Pods linear or falcate, sub-terete or compressed. Leaves pinnately trifoliolate, stipellate, very rarely unifoliolate; stipules persistent, striated; bracts often caducous, stipuliform or small; bracteoles often broad. Few of the species are of any horticultural value. For culture of *P. vulgaris*, *see* **Beans**. The stove species require similar treatment to **Dolichos** (which *see*).

P. Caracalla (Caracalla). Climbing Snail Flower. *fl.* purple and yellowish mixed, large; vexillum and carina spirally twisted; racemes longer than the leaves. August. *l.*, leaflets ovate-rhomboid, acuminated. India, 1690. Plant twining, hardly pubescent. Stove perennial. (A. B. R. 341; B. R. 341.)

P. lobatus (lobed-leaved). *fl.* yellow, in dense racemes; peduncles axillary, solitary, many-flowered; standard and wings more or less twisted; keel with an extraordinary, spirally-twisted, acuminate point. September. *l.* copious, ternate; leaflets hastately trilobed, the terminal one on a long footstalk, the lateral ones almost sessile. Stem twining. Buenos Ayres. Greenhouse perennial. (B. M. 4076.)

P. semi-erectus (slightly-erect). *fl.*, vexillum greenish, tinged with purple; keel purple in the middle, but white on the sides; wings deep purple; peduncles elongated. July. *l.*, leaflets ovate-lanceolate, acute, glabrous. Stems twining at the apex. South America, 1781. Stove annual. (B. R. 743.)

P. vulgaris (common). Dwarf, or French Kidney Bean. *fl.* variable, usually white or lilac; racemes pedunculate, shorter than the leaves; pedicels twin. June to September. *l.*, leaflets ovate, acuminated. Plant twining, smoothish. Tropical and temperate regions; "universally cultivated, but not anywhere clearly known as a wild plant" (Baker). 1597. Tender annual. *See also* **Beans**.

P. v. multiflorus (many-flowered). Scarlet Runner. This differs from the type by its bright scarlet, casually white, flowers, arranged in long racemes, which often overtop the leaves. *See* **Beans**.

PHEASANT'S EYE. A common name for *Adonis æstivalis*, *A. autumnalis*, and *Dianthus plumarius*.

PHEBALIUM (from *Phibale*, a Myrtle; alluding to the appearence of the species). ORD. *Rutaceæ*. A genus comprising (according to Bentham) twenty-eight species of greenhouse, glabrous or stellate-pubescent, scaly or rarely hirsute shrubs or small trees, of which one is a native of New Zealand, and the rest are all South Australian. Flowers white or yellow, small, very rarely four or six-merous; calyx segments and petals five, the latter valvate or laterally imbricated, but always with valvate, inflexed tips; inflorescence axillary or terminal; peduncles usually forming a short, umbel-like raceme,

Phebalium—*continued.*

rarely one-flowered or reduced to a compact head. Leaves alternate, simple, entire or slightly toothed, the glands often large and prominent. The species require a compost of three parts sandy peat and one of sandy loam. Propagation may be effected by cuttings of the young wood, inserted in sand, under a glass. The undermentioned species are all Australian.

P. aureum (golden). A synonym of *P. squamulosum*.

P. Billardieri (Labillardière's). *fl.* yellow, in axillary corymbs, shortly pedunculate, but always shorter than the leaves; peduncles and pedicels scaly. April. *l.* oblong, lanceolate, or linear, obtuse or acute, rarely under ½in. and often 3in., sometimes 4in. to 5in. long, silvery-white beneath, with minute scales. 1822. An erect shrub or small tree. SYN. *P. elatum*.

P. elatum (tall). A synonym of *P. Billardieri*.

P. lachnoides (woolly). *fl.* yellow, on short, axillary pedicels, usually crowded near the ends of the branches. May. *l.* crowded, narrow-linear, obtuse or scarcely mucronate, rarely exceeding ½in. long, the margins revolute, glabrous above, hoary beneath. Branches minutely stellate-pubescent. *h.* 3ft. 1824.

P. squamulosum (slightly scaly). *fl.* yellow, in terminal, sessile, simple or compound umbels or corymbs, not exceeding the last leaves; pedicels, calyx, and petals covered with comparatively large scurfy scales. May. *l.* shortly petiolate, oblong or linear, obtuse, but often mucronulate, ½in. to 1½in. long, the margins flat or slightly recurved, smooth above or slightly glandular-tuberculate, covered underneath with scurfy peltate scales. Young branches brown, with scurfy scales. *h.* 2ft. 1824. SYN. *P. aureum*.

PHEGOPTERIS. Included under **Polypodium** (which *see*).

PHELIPÆA (named after the Philipeaux family, patrons of the botanist Tournefort). SYNS. *Anoplanthus* (in part), *Macranoplon* (in part). ORD. *Orobanchaceæ*. A genus comprising only a couple of species of singular and beautiful, puberulous or glabrous, hardy, leafless, Oriental herbs. Flowers scarlet, large, ebracteolate, always solitary, on a few-scaled, elongated scape or naked peduncle; calyx broadly campanulate, cut into five unequal, acute lobes; corolla tube broadly ventricose, incurved; limb large, spreading, sub-bilabiate, with five broadly rotundate, scarcely unequal lobes. "Only one species has yet been successfully cultivated. It is a hardy perennial (?), parasitical upon the roots of *Centaurea dealbata*. The seeds should be sown with those of the Centaurea, together, in the same pot, when probably some will germinate, fasten themselves upon the roots of the seedling Centaureas, and develop into plants" (N. E. Brown).

P. foliata (leafy). *fl.*, corolla inflated, ventricose; tube nearly 1in long; limb nearly 1in. in diameter, the throat having two dark velvety spots; stamens inserted below the middle of the tube; scape 1ft. long, terete, somewhat flexuous, striated, glabrous, or somewhat puberulous at apex; scales semi-amplexicaul, sheathing, remote. Caucasus, 1880. SYNS. *Anoplanthus Biebersteini* (R. G. 1000), *A. foliata*.

PHENAKOSPERMUM. Included under *Ravenala*.

PHEROTRICHIS. A synonym of **Lachnostoma** (which *see*).

PHIALIS. A synonym of *Bahia*.

PHILADELPHEÆ. Included under *Saxifrageæ*.

PHILADELPHUS (an ancient Greek name, meaning brotherly love, applied, by Athenæas, to a different plant). Mock Orange; Syringa. ORD. *Saxifrageæ*. A genus comprising about twelve species of hardy, ornamental shrubs, natives of central Europe, temperate North America, Japan, and the Himalayan Mountains. Flowers white or straw-coloured, often sweet-smelling, axillary, solitary or corymbose, bracteate; calyx tube turbinate, adnate to the ovary; lobes four, rarely five, valvate; petals four, rarely five, rotund or obovate, convolute; stamens twenty to forty. Leaves opposite, deciduous, entire or serrate, often covered with stellate down; stipules wanting. Branches rather terete, opposite. The species are of easy culture in any fairly good soil. The plants flower on the wood of the previous year; this may be cut away when flowering is over, and

Philadelphus —*continued.*

FIG. 105. FLOWERING BRANCHLET OF PHILADELPHUS CORONARIUS.

the new growths encouraged to take its place for the year immediately following. In this way, the shrubs, though large, may be kept within limited bounds, and encouraged to flower more freely because of the wood becoming better ripened. Propagated, in spring, by

FIG. 106. FLOWERING TWIG OF PHILADELPHUS CORONARIUS PRIMULÆFLORUS (natural size).

Philadelphus —*continued.*

suckers, by layers, or by cuttings of the young shoots, struck under glass, either in heat, or in a moist, cold frame.

P. chinensis (Chinese). A synonym of *P. Satzumi*.

P. coronarius (garland).* Common Mock Orange or Syringa. *fl.* white, with a strong, orange-like scent, racemose. May. *l.* ovate, acuminated, serrately denticulated, smoothish, having the odour and taste of cucumbers, when crushed. Stems stiff, straight. *h.* 2ft. to 10ft. South Europe, &c., 1596. A handsome species. See Fig. 105. (B. M. 391.) There are several forms, including some with double flowers, one of which (*primulæflorus*) is shown in Fig. 106; another, in which the leaves are edged with white or yellow; and a third, with golden-yellow leaves. *nanus*, a dwarf form, is sometimes seen in cultivation.

P. Gordonianus (Gordon's).* *fl.* white, scentless, and produced in great abundance; racemes terminal, compact, five to nine-flowered. July. *l.* ovate, acuminate, serrulate. *h.* 10ft. North-west America. See Fig. 107. (B. R. 1839, 32.)

P. grandiflorus (large-flowered).* *fl.* white, large, sweet-scented. June. *l.* pubescent when young, ovate-acuminate or nearly rotundate, irregularly toothed. Stems rather slender, twiggy. *h.* 6ft. to 10ft. South United States, 1811. SYN. *P. speciosus*. (S. B. F. G. ser. ii. 8.)

P. g. laxus (loose). *fl.* white, solitary and in threes. June. *l.* ovate, long-acuminated, toothed, clothed with hairy pubescence beneath. *h.* 4ft. to 6ft. North America, 1830. (B. R. 1839, 39.)

FIG. 107. FLOWERING BRANCH OF PHILADELPHUS GORDONIANUS.

P. hirsutus (hairy).* *fl.* white, solitary and in threes. June. *l.* oblong-ovate, acute, toothed, hairy on both surfaces, white beneath. *h.* 3ft. North America, 1820. (B. M. 5334; S. B. F. G. ser. ii. 119.)

P. inodorus (scentless).* *fl.* white, large, scentless, solitary and in threes. June. *l.* broad-ovate, acuminate, entire. *h.* 4ft. to 6ft. Mountains of Virginia and southward, 1738. (B. M. 1478.)

P. Lewisii (Lewis'). *fl.* white, smaller than those of *P. hirsutus*, solitary and in threes. June. *l.* ovate, acute, almost entire, with ciliated margins. *h.* 6ft. to 8ft. North America, 1739.

P. microphyllus (small-leaved). *fl.* terminal, solitary or in threes. Summer. *l.* ½in. to ¾in. long, ovate-lanceolate or oblong, entire, slightly obtuse, obsoletely triplinerved, minutely pilose beneath. Branches slender, erect. New Mexico, 1883.

P. Satzumi (Satsum's). *fl.* white, about 1½in. across, produced in pairs at the ends of the shoots. July. *l.* long, narrow. *h.* 5ft. Japan, 1851. A slender-growing plant. SYN. *P. chinensis*.

P. speciosus (showy). A synonym of *P. grandiflorus*.

PHILAGERIA (a combination of parts of the generic names of the two parents). ORD. *Liliaceæ*. A monotypic garden hybrid genus, raised by Messrs. Veitch, between *Philesia buxifolia* and *Lapageria alba*. The plant is a half-hardy, scrambling shrub, with slender, flexuous branches. In habit, *Philageria Veitchii*, is, according to Dr. Masters, "more akin to the female parent (*Lapageria*) than to the male. Its foliage is singularly intermediate, but at the same time nearest like that of the pollen parent (*Philesia*). In the characters of the flower-stalk, calyx, and corolla, it is more like *Philesia* than *Lapageria*; but in the stamens, it approximates to the mother plant, and diverges from the characters of the male. In colour it is also more like the mother plant than it is like *Philesia*." This, like its allies, requires a peat soil, and a moist, cool house; it is, however, so shy a flowerer as to be worthless for decorative purposes.

P. Veitchii (Veitch's). *fl.* solitary, pendulous; calyx of three pale rose-purple, boat-shaped, fleshy sepals; petals three, bright rose-coloured, slightly unequal, overlapping, broadly ovate, acute; stamens six, the filaments pink-spotted; pedicels axillary, bracteate. *l.* alternate, petiolate, oblong, acute, about 1¼in. long, leathery, smooth, dark shining green above, finely serrulated; petioles about ½in. long. Gardens, 1872. (G. C. 1872, 119.)

PHILESIA (from *phileo*, to love; alluding to the beauty of the flowers). ORD. *Liliaceæ*. A monotypic genus. The species is a glabrous, much-branched, greenhouse shrub. It thrives best in peaty soil, but grows slowly. In sheltered positions in Ireland, and in South-western England, it succeeds in the open air. Suckers are thrown up, by which the plant may be increased.

P. buxifolia (Box-leaved).* *fl.* red, showy, but smaller than those of *Lapageria* (to which this shrub is allied), solitary or very few at the tips of the branches, very shortly pedicellate; outer perianth segments erect, inner ones twice or thrice as long, somewhat spreading above; stamens six. June. *l.* alternate, very shortly petiolate, oblong, coriaceous, one-nerved, very slenderly reticulate-venulose; margins revolute. *h.* 4ft. Chili, &c., 1850. (B. M. 4738.)

PHILESIACEÆ. Included under *Liliaceæ*.

PHILIBERTIA (named in honour of J. C. Philibert, author of some works on elementary botany). SYN. *Sarcostemma* (in part). ORD. *Asclepiadeæ*. This genus comprises about thirty species of stove, twining shrubs or sub-shrubs, natives of tropical and sub-tropical America. Flowers usually greenish-white, or purple-veined inside; calyx small, five-parted; corolla often depresso-globose in bud, very broadly campanulate or sub-rotate when expanded, with five contorted, narrow lobes; cymes umbelliform. Leaves opposite. Few of the species are known to cultivation. Those described below are well adapted for training up rafters, pillars, or trellis-work, in stoves or conservatories. A compost of loam, peat, and sand is desirable. Cuttings will root readily, if inserted in sand, or in the above-named soil, under a glass, in slight heat.

P. campanulata (bell-shaped). *fl.* greenish-yellow, purplish-marked within, large, campanulate, pubescent outside; peduncles many-flowered, shorter than the leaves. October. *l.* ovate-oblong, acuminate, deeply cordate at base, tomentose beneath. *h.* 6ft. Peru. Greenhouse climbing shrub. (B. R. 1846, 36, under name of *Sarcostemma campanulatum*.)

P. gracilis (slender).* *fl.*, corolla yellowish outside, red-striped inside, three times as long as the calyx. *l.* deeply cordate, acuminate, sub-tomentose. Buenos Ayres. Greenhouse sub-shrub. (S. B. F. G. ser. ii. 403.)

P. grandiflora (large-flowered). *fl.*, corolla puberulous without, elegantly purple-striped within, with obtuse lobes; peduncles many-flowered. June. *l.* cordate, acute, pubescent above, incano-tomentose beneath, petiolate. Buenos Ayres, 1836. Plant pubescent. Greenhouse sub-shrubby climber. (B. M. 3618; B. R. 1843, 13.)

PHILLYREA (from *Philyra*, the old Greek name used by Theophrastus for the Privet). Jasmine Box; Mock Privet. ORD. *Oleaceæ*. A genus comprising only four species of ornamental, hardy, evergreen, glabrous or rarely cano-pubescent shrubs, natives of the Mediterranean region and the Orient. Flowers small, fasciculate in the axils; calyx and corolla four-lobed, those of the latter imbricated and obtuse. Drupe globose or ovoid, one or two-seeded. Leaves opposite, entire or serrulated. Several so-called species are merely varieties. Phillyreas thrive in almost any soil; but in the northern parts of this country they must have very sheltered positions. *P. Vilmoriniana* is the hardiest. Like the rest, it may be propagated from cuttings, or be grafted on the Privet.

Phillyrea—*continued.*

P. angustifolia (narrow-leaved). *fl.* white. May. *l.* linear-lanceolate, quite entire, obsoletely veined. Branches beset with elevated dots. *h.* 8ft. to 10ft. Italy and Spain, 1597. The following are forms of this species: *brachiata*, with very short, oblong-lanceolate leaves, and divaricate branches; *lanceolata*, with lanceolate leaves and erect branches; and *rosmarinifolia*, with elongated, lanceolate-subulate leaves, and straight branches.

P. latifolia (broad-leaved). *fl.* white. May. *l.* ovate, rounded at the base, serrated, veiny; young ones sub-cordate at the base. *h.* 20ft. to 30ft. South Europe, 1597. (S. F. G. 2.) Of this, the following are forms: *lævis*, with ovate, flat, obsoletely-serrated leaves; *obliqua*, with lanceolate-oblong, acute, serrated, oblique leaves. *buxifolia*, *crispa*, *ilicifolia*, and *macrophylla*, are varieties with sufficiently distinctive names.

P. media (intermediate).* *fl.* white. May. *l.* lanceolate, quite entire, or a little serrated in the middle, triplinerved, veiny. *h.* 10ft. to 15ft. South Europe, 1597. The following are varieties: *pendula*, with lanceolate leaves, and divaricating, pendulous branches; *virgata* (SYNS. *ligustrifolia* and *oleæfolia*), with oblong-lanceolate leaves.

P. Vilmoriniana (Vilmorin's).* *fl.* whitish, numerous, in axillary clusters. *l.* resembling those of the Portugal Laurel. This plant is known in gardens under the name of *P. laurifolia*. Asia Minor, 1885. (B. M. 6800.)

PHILODENDRON (from *phileo*, to love, and *dendron*, a tree; referring to the arborescent nature of some species). ORD. *Aroideæ* (*Araceæ*). A genus comprising about 120 species of stove, climbing shrubs and small trees, rarely stemless herbs, natives of tropical America. Flowers spathaceous; spathe white, red, or yellow, thick, wholly persistent, the tube convolute, at length opening; spadix almost equalling, or shorter than, the spathe, sessile or shortly stipitate, dense-flowered, the females shorter than the males; peduncles terminal and axillary, usually short, generally fascicled. Leaves sheathed, opposite, coriaceous, oblong, ovate, cordate, or sagittate-hastate, entire, lobed, pinnatifid, or once or twice pinnatisect. Philodendrons are easily grown in a house where a high temperature and a moist atmosphere are maintained. They appear to the best advantage when trained to cover a back wall or a pillar. For this purpose, in a large house, they may be planted out at the base of the wall or pillar, or they may be grown in pots. An open compost of loam and peat, or leaf mould, to which some coarse sand should be added, is best; the plants are not, however, very fastidious regarding soil. Plenty of water and frequent syringings are essential in the summer or growing season; and no more shade should be applied than is requisite to keep the leaves from scorching. Propagated easily by dividing the stems into lengths consisting of about three joints, and inserting them in pots, in a brisk heat. They soon become established, and make new growth at the top. Any old plants which get too high for the house they occupy may have their tops cut off and inserted as large cuttings. These soon re-establish themselves. The best-known species are described below.

P. bipinnatifidum (bipinnatifid). *fl.*, spathe reddish-brown outside, greenish inside; spadix whitish. *l.* about 2ft. long and 1½ft. broad, bright green, bipinnatifid. Brazil. An ornamental, short-stemmed species, requiring only a cool stove or intermediate house.

P. brevilaminatum (short-bladed). *fl.*, tube of spathe oblong-ovoid, blood-colour[illegible] both sides, the limb pale green outside, yellowish-white within; spadix white, shorter than the spathe, stipitate. *l.* as long as the petioles; young ones cordate-ovate, very shortly rotundate; adult ones sub-triangular, the posterior lobes broadly rotundate, the anterior one broadly triangular, Bahia, 1860. Climber.

P. calophyllum (beautiful-leaved). *fl.*, spathe creamy outside, crimson within; spadix white. Brazil, 1872. A very handsome, short-stemmed plant, the foliage of which resembles that of *Cochliostema Jacobianum*. (I. H. n. s. 76.)

P. cannæfolium (Canna-leaved). *fl.*, spathe greenish. *l.* ovate-lanceolate, deep shining green, about 1ft. long; petioles very

Philodendron—*continued.*

stout, 1ft. long. Brazil, 1831. A desirable, short-stemmed perennial, particularly suitable for sub-tropical gardening.

P. Carderi (Carder's). A synonym of *P. verrucosum.*

P. crassinervium (thick-nerved).* *fl.*, spathe pale yellow-green, spotted with red, bright red within at the base, cucullate, contracted in the middle; spadix as long as the spathe, cylindrical. May. *l.* 1ft. to 2ft. long, broadly lanceolate, margined with red, the costa exceedingly thick and inflated; petioles 3in. to 4in. long, purplish-green. Stem running to a considerable length. A singular climber. (B. M. 3621; B. R. 1958.)

P. daguense (River Dagua). A synonym of *P. verrucosum.*

P. erubescens (blushing).* *fl.*, spathe blackish-purple outside, scarlet within, large, boat-shaped, contracted above the middle; spadix white or cream-colour, as long as the spathe, stout, obtuse. *l.* distant, alternate, large, between cordate and sagittate, coppery beneath, glossy, 1ft. or more long, on terete pedicels of about the same length, with purple sheaths at the base. Stem stout, climbing, rooting at almost every joint. A handsome species. (B. M. 5071.)

P. fragrantissimum (highly fragrant).* *fl.* powerfully and durably fragrant; spathe delicate cream-colour, with the swollen base red, nearly 9in. long, convolute and somewhat cucullate; spadix acute, nearly as long as the spathe, broadest at base. January. *l.* 1½ft. to 2ft. long, oblong-cordate, acute, inclining to sagittate, deeply two-lobed at base; petioles 2ft. or more long, quite flat above. Stem elongated, rooting. Demerara. (B. M. 3314, under name of *Caladium fragrantissimum.*)

P. giganteum (gigantic). *fl.*, tube of spathe oblong, purplish outside; spadix white, thick, sessile; peduncle very short and thick. *l.* broadly cordate-ovate, with the posterior lobes broadly semi-ovate or obliquely semi-orbiculate; petiole thick, slightly terete, twice as long as the costa. 1857. Climber.

P. Glaziovii (Glaziou's). *fl.* solitary, axillary; spathe pale yellowish, crimson on the inside of the tube. *l.* oblong, acute, deep green, 1ft. to 1½ft. long, 3in. to 5in. broad. Brazil, 1885. An ornamental climber, resembling *P. crassinervium.* (B. M. 6813.)

P. gloriosum (glorious). *l.* large, cordate-ovate, acute, deep rich green, the midrib and secondary nerves snow-white, the margins bordered with a thin edging of a pink colour; the young ones, on opening, have a silky reflection. Stem climbing. Columbia, 1877. A magnificent foliage plant. (I. H. n. s. 262.)

P. grandifolium (large-leaved).* *fl.* from a fissure at the base of the petiole; spathe at first pale green, afterwards pale buff, green at base on the outside, pinkish within, marked at the back with a purple hue, cucullate at the extremity; spadix green below, white above, as long as the spathe, slightly club-shaped, bursting two or three together. April. *l.* 2ft. or more long, cordate-sagittate, opaque above; petioles rounded, spotted with purple. Stem climbing, dingy-green, spotted with purple. Demerara. (B. M. 3345, under name of *Caladium grandifolium.*)

P. Holtonianum (Holton's). *fl.*, tube of spathe oblong; spadix very shortly stipitate, slender, cylindrical. *l.* ornamental, three-parted almost to the base, about 1½ft. long and rather less in width; middle lobe acute, one-nerved; lateral lobes obtuse, three-nerved; all shining green above, pale [illegible] Columbia, 1876. Dwarf, almost stemless, herb. [illegible] of this plant is *Anthurium insigne.*

P. laciniatum (jagged). *fl.*, tube of spathe greenish without, reddish-purple within, the blade dirty white; spadix sessile; peduncles three or four in the same axil. *l.* membranous, tripartite, less than half as long as the slightly terete petioles. Stem rather thick, climbing. Brazil, 1824. SYN. *Caladium pedatum* (H. E. F. 206).

P. Lindeni (Linden's). A garden synonym of *P. verrucosum.*

P. longilaminatum (long-bladed). *fl.*, females twice as short as the males; spathe shorter than, and peduncle about as long as, the petiole. *l.* green above, slightly glaucous below, with the apex long-acuminate; petioles thick, semi-terete, sulcate. Stem

Philodendron—*continued.*

elongated, somewhat climbing; internodes elongated. Bahia, 1860.

FIG. 108. PHILODENDRON MAMEI.

P. Mamei (Mons. Mame's).* *l.* large, cordate, acute, handsomely marked with whitish variegations. Ecuador, 1883. A fine-leaved, stemless herb. See Fig. 108. (R. H. 1883, 492.)

P. melanochrysum (golden-black).* *l.* dull, dark green in colour, covered with a shining varnish, as though washed over with gold, appearing very brilliant in the sunshine. Columbia, 1874. A lovely species, of moderate growth and climbing habit. (I. H. n. s. 149.)

P. Melinoni (Melinon's). *fl.*, spathe cylindrical, rufescent outside, yellow within; spadix cylindrical, shorter than the spathe. *l.* long-stalked, ovate, oblong, acuminate, sagittate-hastate at base. Stem, short, thick, shaggy. Guiana, 1871. (R. G. 789.)

P. pertusum (perforated). A synonym of *Monstera deliciosa.*

P. pinnatifidum rubro-punctatum (pinnatifid, red-dotted).* *fl.* crowded; spathe white, sprinkled with blood-red, almost sessile, the same length as the spadix, the tube narrowly ovoid, the blade boat-shaped; spadix pale dirty yellow, about ⅓in. long. May. *l.* 2ft. long, broadly sagittate-ovate, glossy, pinnatifid halfway to the middle, with regular, upcurved lobes; petioles 2½ft. to 3ft. long, swollen at base. Stem none, or short and thick, clothed with brown sheaths. South Brazil, 1868. (B. M. 5948, under name of *P. rubro-punctatum.*)

P. recurvifolium (recurved-leaved). *fl.*, spathe green without, the tube scarlet within, ellipsoid. *l.* all on petioles, which are shorter than the blade, green, margined with purple, somewhat oblong-cordate-sagittate. Bahia, 1860. Climber. The whole plant, especially the leaves, is irregularly spotted with blood-colour.

P. rubens (reddish). *fl.*, spathe 6in. to 8in. long, whitish-green without, purplish-red within, on a short peduncle; spadix white, cylindrical, slightly shorter than the spathe; inflorescence sessile. *l.* cordate-ovate, acuminate, the length of the petioles. Stem robust, somewhat erect, rather densely leafy. Venezuela, 1873. Climber. (B. M. 6021.)

P. sanguineum (bloody).* *fl.*, spathe green, convolute above the middle; spadix shortly stipitate, cylindrical; peduncles half as long as the spathe. *l.* rather thick, green above, often purplish beneath, elongated, cordate-oblong, [illegible] petioles shorter than, or about equalling, the leaves. Mexico, 1869. Climber. (R. G. 621.)

P. Selloum (Sello's).* *fl.*, spathe deep green, bordered with white outside, whitish within, large, [illegible], terminating in a sort of hood. *l.* large, long-stalked, oval-oblong, deep green, forming a broad head, bipinnatifid, with the two basal lobes themselves pinnatifid. Stem stout, emitting thick, flexible roots. A beautiful (arborescent when old) perennial. See Fig. 109. (B. M. 6773; R. H. 1869, 252, under name of *P. Sellowianum.*)

P. serpens (serpent). *fl.*, spathe pinkish and yellowish outside, cream and crimson inside, 5in. long; spadix cream-coloured. *l.* oblong-cordate, 1ft. to 1½ft. long. Stem scandent, rooting at the nodes, leafy at the summit, clothed between the leaves with dense masses of fibry scales. New Grenada, 1877. A handsome species. (B. M. 6575.)

Philodendron—*continued.*

P. Simsii (Sims').* *fl.*, spathe crimson, and inflated at base, contracted in the middle, and expanded in the upper part into a white, oval hood, about 8in. long, rather exceeding the spadix, nearly sessile. March. *l.* cordate-sagittate, above 2ft. long and 1½ft. across, with large, raised, purple veins beneath; petioles rounded, 1½ft. long. Stem stout, erect. Caraccas and Guiana, about 1825. (B. M. 2643, under name of *Caladium grandifolium*.)

FIG. 109. PHILODENDRON SELLOUM.

P. Sodiroi (Sodiro's). *l.* elongated cordate-ovate, with a very obtuse sinus, short auricles, and a long-pointed apex, soft and twisted, bright green, with large, interrupted, silvery spots; nerves prominent and violaceous beneath; petioles depressed above, violaceous, dotted with white. Tropical America, 1884. An ornamental climber.

FIG. 110. PHILODENDRON SPECIOSUM.

P. speciosum (showy). *fl.*, spathe thick, purplish-green outside, carmine within. *l.* triangular, oblong-ovate, deeply sagittate, light green. Stem tall, arborescent (when mature). South Brazil. See Fig. 110.

P. verrucosum (warted).* *l.* cordate, of a delicate satiny-green, shaded with metallic olive-colour on the upper surface, the under part pale green, ornamented with bands of maroon; the young ones are of a bright chamois-colour, and the maroon bands of the under parts penetrate through to the upper. Ecuador, 1866. One of the most brilliant species grown. See Fig. 111. SYNS. *P. Carderi*, *P. daguense* (I. H. n. s. 79), *P. Lindeni* (of gardens, in part).

P. Williamsii (Williams').* *fl.*, spathes green, yellowish within, thick, obtuse, apiculate, 1ft. long, surrounding a stout, cylindric, cream-coloured spadix. *l.* long-stalked, sagittate-acute, 1ft. to 2½ft. in length. Trunk thick, erect, rooting. Bahia, 1871. A noble plant. (B. M. 5899.)

PHILOGYNE. Included under *Narcissus.*

PHILOTHECA (from *philos*, smooth, and *theke*, a sheath; alluding to the smooth tubes of the stamens). ORD. *Rutaceæ*. A genus comprising only a couple of species of ornamental, erect, Heath-like shrubs, confined to extra-tropical and Eastern sub-tropical Australia. Flowers terminal, nearly sessile, solitary or two or three together; calyx segments and petals five, the latter imbricate in bud; disk slightly lobed. Leaves crowded, alternate, narrow-linear. *P. australis*, the only species introduced, requires culture similar to **Phebalium** (which *see*).

P. australis (Southern).* *fl.* pale red, usually solitary, but sometimes two or three together; sepals broadly triangular; petals broadly lanceolate. April. *l.* numerous, linear, obtuse, rarely exceeding ¼in. long, rather thick, flat or channelled above, very convex underneath, or almost terete. *h.* 2ft. 1822.

PHILYDRACEÆ. A very small natural order of erect, terrestrial herbs, natives of Australia, the Malayan Archipelago, Eastern Asia, and the Pacific Islands. Flowers inclosed in spathaceous bracts, solitary, disposed simply at the sides of a rachis, or in a branched panicle, hermaphrodite, irregular; perianth free to the ovary, and having four segments in two series; stamen one, opposite the posticous perianth segment; filament complanate, often shortly connate at the base with the interior segments. Capsule ovoid or oblong, three-valved, many-seeded. Leaves linear or ensiform, radical or clustered at the base of the stem, often distichous; cauline ones few, smaller. The order contains but four species, and these are split up into three genera: *Helmholtzia*, *Philydrum*, and *Pritzelia*.

FIG. 111. BRANCH AND DETACHED LEAF OF PHILODENDRON VERRUCOSUM.

PHILYDRUM (from *phileo*, to love, and *hydor*, water). SYN. *Garciana*. ORD. *Philydraceæ*. A monotypic genus, the species being a greenhouse biennial, rather more interesting than ornamental. It requires a sandy

Philydrum—*continued.*

loam and peat compost. Seeds should be sown in a gentle heat.

P. glaberrimum (very glabrous). A synonym of *Helmholtzia glaberrima.*

P. lanuginosum (woolly). *fl.* yellow, solitary or twin, on long, simple, interrupted spikes, protected by sheathing bracts; perianth segments four, the outer ones much shorter than the inner ones. June. *l.* lanceolate, divided at the base, covered with dense, woolly hairs, spongy within. Stem erect, slightly branched. *h.* 2ft. to 3ft. Tropical Asia, Australia, &c., 1801. (B. M. 783.)

PHINÆA (an anagram of *Niphœa*, to which this genus is closely allied). ORD. *Gesneraceæ.* A genus comprising three or four species of dwarf, erect, villous, stove herbs, with the habit of *Niphœa* (under which they have until recently been included), natives of Columbia. Flowers white or pale lilac; calyx turbinate-campanulate, the tube adnate to the ovary, the lobes five, obtuse; corolla tube very short, the limb shortly and broadly five-lobed; pedicels twin or fasciculate in the axils, rather long. Leaves opposite, petiolate, soft. For culture, *see* **Achimenes.**

P. albo-lineata (white-lined).* *fl.* white, borne on axillary, umbellate peduncles. September. *l.* opposite, long-stalked, ovate-acute, crenate-serrated, often purplish beneath. *h.* 9in. New Grenada, 1844. (B. M. 4282, and F. d. S. 210, under name of *Niphœa albo-lineata.*)

P. a.-l. reticulata (netted). This variety differs from the type only in the discoloured nerves of the leaves being reticulated. (B. M. 5043 and F. d. S. 8, 823, under name of *Niphœa albo-lineata reticulata.*)

P. rubida (reddish).* *fl.* white, very numerous, fasciculate, very long-stalked. July. *l.* clustered, ovate, sub-cordate-auriculate at base, toothed. Branchlets very short. *h.* 6in. Guatemala, 1846. Whole plant reddish velvety-villous. (F. d. S. iii. 251, under name of *Niphœa rubida.*)

PHLEBIGONIUM. Included under *Nephrodium.*

PHLEBIOPHYLLUM. Included under **Trichomanes** (which *see*).

PHLEBODIUM. Included under **Polypodium** (which *see*).

PHLEUM (from *Phleos*, an old Greek plant name used by Theophrastus). SYN. *Stelephuros.* ORD. *Gramineæ.* A genus comprising about half-a-score species of hardy, annual or perennial, erect grasses, natives of Europe, Central and North Asia, North Africa, and North and Antarctic America. Panicle rather long, pedunculate, always densely spike-formed, sometimes elongated, narrow-cylindrical, sometimes shorter, oblong or scarcely ovoid, often pubescent; spikelets one-flowered, with rarely a rudimentary second flower; glumes three; stamens three. *P. alpinum*, *P. arenarium*, *P. phalaroides* (*P. Boehmeri*), and *P. pratense* (Cat's Tail, or Timothy Grass), are natives of Britain. The species have no horticultural value.

PHLOGACANTHUS (from *phlox*, *phlogos*, flame, and *Acanthus*; from the flame-coloured flowers of some species). SYN. *Loxanthus.* ORD. *Acanthaceæ.* This genus contains about twelve species of tall, stove shrubs or herbs, inhabiting the Himalayan Mountains and Martaban. Flowers whitish, reddish, or greenish, cymose; cymes disposed in long, thyrsoid, terminal spikes, or axillary and shorter; corolla tube large, incurved. Leaves entire, or slightly toothed, often large. For culture, *see* **Justicia.**

P. asperulus (slightly rough).* *fl.*, corolla purplish-red, somewhat funnel-shaped; tube short, rather gibbous at base; spike terminal, on a quadrangular peduncle. January. *l.* large, opposite, remote, broadly ovate-lanceolate, obscurely serrate, entire at base, petiolate. *h.* 3ft. Khasia Mountains, Assam, &c. Shrub. (B. M. 2845 and B. R. 1340, under name of *Justicia quadrangularis*; L. B. C. 1681, under name of *Justicia asperula.*)

P. curviflorus (curved-flowered).* *fl.* yellowish, with an elongated corolla. November. *l.* large, elliptic, acute at both ends, toothed, glabrous. Stems quadrangular, downy. *h.* 3ft. to 6ft. Khasia Mountains, 1839. Shrub. (B. M. 3783.)

P. guttatus (spotted-flowered). *fl.* yellow, spotted, fascicled; racemes terminal. Spring. *l.* oblong, attenuated at both ends, sub-crenulated. *h.* 2ft. India, 1828. Herb. (B. R. 1334.)

PHLOMIS (the old Greek name used by Dioscorides). ORD. *Labiatæ.* A genus of tomentose, woolly, canescent, or greenish, mostly hardy herbs, sub-shrubs, or shrubs, inhabiting temperate and mountainous Asia and the Mediterranean region. Upwards of seventy plants have been described as species, but, probably, not more than fifty are sufficiently distinct to merit specific rank. Flowers yellow, purple, or white; corolla with an inclosed or scarcely exserted tube, the upper lip compressed, entire or notched, tomentose or villous, sessile, and the lower three-cleft and spreading; whorls many-flowered, axillary; bracteoles often numerous, ovate, lanceolate, or narrow, appressed. Nutlets ovoid-triquetrous. Leaves wrinkled; floral ones conformed, or the uppermost ones diminutive. All the species are of easy culture in ordinary garden soil; they are well adapted for naturalising in shrubberies, wild banks, and borders. All may be increased by seeds; the shrubby sorts also by cuttings, and the herbaceous kinds by division. The under-mentioned species are those best known to cultivation, and are, except where otherwise indicated, hardy perennial herbs.

P. armeniaca (Armenian). *fl.*, corolla yellow, similar to that of *P. lychnitis*; whorls six-flowered; bracts mucronulate. June and July. *l.* obscurely crenated; radical ones oblong; petioles cordate-oblong, obtuse; cauline ones lanceolate, attenuated at base. *h.* 6in. to 12in. Armenia, 1834. Plant floccose-woolly. (S. B. F. G. ser. ii. 364.)

P. cashmeriana (Cashmere).* *fl.* pale lilac; corolla larger than in *P. pungens* (to which species this is allied); bracts subulate, ciliated, longer than the calyx. July. *l.* ovate-lanceolate, obtuse, crenated towards the apex, broadly rounded at base, pubescent or villous above, white-tomentose beneath. Stem densely floccose-tomentose. *h.* 2ft. Cashmere. (B. R. 1844, 22.)

P. ferruginea (rusty).* *fl.* yellow, densely tomentose outside; whorls twelve to twenty-flowered. June. *l.* oblong-lanceolate, obtuse, crenulated, cordate at the base, much wrinkled and green above, but tomentose beneath. Branches clothed with rusty-purple, loose wool. *h.* 2ft. to 3ft. Italy, Crete, &c., 1823. Hardy shrub.

P. floccosa (floccose). *fl.*, corolla yellow, the size of that of *P. Samia*; whorls few, distant, large, twenty to thirty-flowered. July to October. *l.* ovate-oblong, much wrinkled, cordate at base, greenish above, and clothed with floccose wool beneath. Branches also floccose-woolly. *h.* 2ft. Egypt, 1828. Half-hardy sub-shrub. (B. R. 1300.)

P. fruticosa (shrubby).* Jerusalem Sage. *fl.* yellow or dusky-yellow, very showy; whorls solitary or twin at the tops of the branches, twenty to thirty-flowered. June. *l.* ovate or oblong, roundly cuneated at the base, wrinkled, green above, and clothed with white tomentum beneath. Branches clothed with tomentum, which is usually yellow. *h.* 2ft. to 4ft. Mediterranean region, 1596. Hardy shrub. (B. M. 1843; S. F. G. 563.)

P. herba-venti (wind-herb).* *fl.* purplish-violet, tomentose outside; whorls ten to twenty-flowered. July to September. *l.* oblong-lanceolate, crenated, rounded at the base, coriaceous, green on both surfaces, or canescent beneath. Branches beset with long hairs. *h.* 1ft. to 1½ft. Mediterranean region, &c., 1596. An erect, divaricately much-branched species. (B. M. 2449; S. B. F. G. ser. ii. 74; S. F. G. 564.)

P. lychnitis (link). Lamp-wick. *fl.*, corolla yellow, twice as long as the calyx. June to August. *l.* sessile, oblong-linear, narrowed at both ends, stem-clasping; cauline ones 2in. to 3in. long, scarcely ⅓in. broad, green or canescent above, white-tomentose beneath; floral ones very broad at base. *h.* 2ft. South Europe, 1658. Plant suffruticose, hoary-tomentose. (B. M. 999.)

P. pungens (pungent). *fl.*, corolla purplish-violet; whorls six to ten-flowered; bracts subulate, ciliated. July. *l.* on short petioles, ovate-lanceolate, quite entire or serrated, rounded at base, shining green above, and rather scabrous, clothed with hoary tomentum beneath. Branches also hoary-tomentose, divaricating. *h.* 1½ft. to 2ft. South-eastern Europe, 1820. (S. B. F. G. 33.)

P. Samia (Samos). *fl.* greenish cream-colour on the outside, and thickly set with hairs, pinkish inside; lower lip also pinkish inside, with numerous, darker-coloured veins or streaks; whorls axillary and terminal, ten to fifteen-flowered; bracts numerous, linear, very acute. Early summer. *l.* ovate-cordate, acute, crenated, wrinkled, green above, clothed with grey tomentum beneath, on hairy stalks. Stems herbaceous, tall, pubescent. *h.* 2ft. to 3ft. North Africa, &c., 1714. (A. B. R. 584; B. M. 1891; S. F. G. 564.)

P. tuberosa (tuberous). *fl.* purplish-rose, densely hairy, very numerously disposed in dense whorls; upper lip very hairy, and margined with a delicate white fringe; lower lip perfectly smooth. June. *l.* ample ovate, obtuse, crenated, deeply cordate at the

Phlomis—*continued.*

base; floral ones oblong-lanceolate. Stem herbaceous, purplish. Roots tuberous. *h.* 3ft. to 5ft. East of Europe to Siberia, 1759. (B. M. 1555.)

P. viscosa (clammy). *fl.* yellow, tomentose outside; whorls large, from forty to fifty-flowered; bracts linear, very acute. June. *l.*, radical ones very ample, ovate, deeply cordate at the base, all wrinkled, green above, and tomentose beneath. Branches tall, almost simple, tomentose. *h.* 3ft. to 5ft. Syria, 1821. (B. M. 2542, under name of *P. lunarifolia Russelliana.*)

PHLOX (from *phlox*, flame; alluding to the general brilliancy of the flowers). ORD. *Polemoniaceæ.* A genus comprising twenty-seven species of hardy, erect or diffuse, tall or tufted, perennial, or rarely half-hardy annual herbs, natives of North America and Russian Asia. Flowers red, violet, or white, usually showy, sometimes solitary, sessile or stalked, sometimes cymose, the cymes disposed in terminal, corymbose or thyrsoid panicles; calyx tubular-campanulate, with five acute or acuminate lobes; corolla salver-shaped, with equal obovoid, orbiculate, or obcordate lobes. Leaves entire; cauline ones opposite, or the uppermost ones alternate.

The perennial species and varieties of *Phlox* may fairly be designated some of the best and most popular of garden plants. They are all very easily cultivated, and a selection from the genus is practically within the reach of everybody. Some of the species are dwarf, creeping plants, well adapted for the rockery, or front line of a mixed border. Where they can be obtained in sufficient quantity, they are sometimes employed with success for spring bedding. *P. subulata* and its varieties are the best known of the dwarf, creeping kinds; they may, therefore, be referred to as examples. None of these dwarf species seed freely; they are propagated chiefly by means of cuttings or divisions. Cuttings should be inserted in a cold frame about July, and kept shaded from bright sunshine. They will form good plants by the following spring, when they may be placed in permanent quarters outside for flowering. Large plants may be easily converted into numerous small ones by shaking some light soil amongst them in summer, and then dividing in autumn, when the trailing branches will be found to have rooted. Any well-drained ordinary soil will suit, but a sunny exposure is most desirable. Dwarf tufted species of *Phlox* are rarely injured by frost; but it is not unusual for large patches to die away in winter when the weather is very mild and damp.

Other distinct groups or sections which are much more generally cultivated than those already referred to, are the early or summer-flowering, and the autumn or late-flowering, tall-growing varieties. These are highly attractive, and, as they succeed each other in flowering, it is a good arrangement to plant some of both alternately. They may be propagated from seed; by cuttings of the young stems, shoots, or roots; and by division. Seeds preserved with a view to raising new varieties should only be gathered from extra good plants. They should be sown, when collected, in pans filled with sandy loam, and be kept in a warm greenhouse or pit until spring, when the young plants will appear. These should be grown on, and eventually hardened, to plant out in April or May, if strong enough. Many will flower the first season, but not so strongly as in the second. Oftentimes, the seeds germinate irregularly, especially if they are kept long before being sown. Cuttings root very readily at almost any season, in a little warmth; they may be procured at the end of March, in large quantities, from the base of old plants. For increasing new or scarce varieties, cuttings may be made of pieces of root. These may be cut into short lengths and treated somewhat like seeds. Propagating by division simply consists in lifting the plants in early spring, cutting them at the base into small pieces, and replanting. These tall-growing perennials succeed best in rather heavy soil, and where it is of a good depth; they will, however, thrive fairly well in

Phlox—*continued.*

any good border or bed. A thick top-dressing of manure, in summer, is of great help, both by preventing evaporation and affording nutriment. If the weather is dry, a heavy drenching of water occasionally is also recommended, as it tends to considerably prolong the flowering season. The plants are very attractive in beds by themselves, or in mixed borders along with other perennials. They are also well adapted for culture in pots, if provided with a rich soil, and grown in a cool, slightly-shaded frame, through the summer.

P. Drummondii is one of the most beautiful and useful half-hardy annuals in cultivation. It may readily be raised from seeds, which should be sown in a little heat, during March, in pans, boxes, or on a partially-spent hotbed. As soon as the seedlings become large enough to handle, they should be pricked off in other boxes, and grown on in frames until May, when they may be gradually inured to the open air. When about 3in. high, the points should be pinched out, with a view to inducing a more compact habit. This species, and its varieties, in numerous colours, are fine for planting in flower-garden beds, amongst other tall-growing subjects that, maybe, are partially naked near the bottom. The plants require a rich soil and plenty of water; like the others, a mulching of manure, in summer, is of great help. Seedlings may also be grown, in pots, for greenhouse decoration; and cuttings may readily be struck for a similar purpose. They will thrive in any ordinary frame after the middle of April.

The most important species, from a garden standpoint, are described below. They are perennials, except where otherwise stated.

FIG. 112. INFLORESCENCE OF PHLOX DRUMMONDII.

P. amœna (pleasing).* *fl.* purple or pink, seldom white, disposed in a compact corymb; corolla lobes obovate, entire, rarely emarginate. June. *l.* slightly erect, oblong, lanceolate, or linear-lanceolate, slightly acute or obtuse. Stem ascendent, simple, 6in. to 15in. high. Virginia to Florida, 1809. Plant softly hairy or villous. SYN. *P. pilosa amœna.* (B. M. 1308.)

P. aristata (awned), of Michaux. A form of *P. subulata.*

P. canadensis (Canadian). A synonym of *P. divaricata.*

P. candida (white). A form of *P. maculata.*

P. carnea (flesh-colour). A form of *P. glaberrima suffruticosa.*

Phlox—*continued.*

P. Carolina (Carolina). A form of *P. ovata.*

P. cordata (heart-shaped). A synonym of *P. paniculata.*

P. corymbosa (corymbose). A synonym of *P. paniculata.*

P. crassifolia (thick-leaved). A synonym of *P. reptans.*

P. decussata. *See* **P. maculata.**

P. divaricata (spreading).* *fl.* pale lilac or bluish, in forked corymbs, the lobes of the corolla obcordate or cuneate, notched at the end, or sometimes entire, equalling or longer than the tube. Spring and early summer. *l.* oval-lanceolate, superior ones alternate. *h.* 9in. to 16in. North America, 1746. (B. M. 163.) SYN. *P. canadensis* (S. B. F. G. 221).

P. Drummondii (Drummond's).* *fl.* red, varying to rose, purple, or white, with a darker eye, on very short pedicels; panicle trichotomously corymbose. August. *l.* ovate-lanceolate, half stem-clasping, all mucronate and downy, lower ones opposite, upper ones alternate. Stems erect, simple at bottom, but a little branched at top, beset with spreading hairs. *h.* 1ft. Texas, &c., 1835. A lovely half-hardy annual. See Fig. 112. (B. M. 3441; B. R. 1949; S. B. F. G. ser. ii. 316.)

FIG. 113. INFLORESCENCE OF PHLOX PANICULATA.

P. frondosa (leafy). A synonym of *P. subulata frondosa.*

P. glaberrima (very glabrous).* *fl.* red, disposed in a corymbose, few-flowered panicle; calyx teeth very acute. July. *l.* lanceolate or linear-lanceolate, the uppermost ones narrowly ovate-lanceolate, firm in texture, almost veinless, bright green and glossy above, often with revolute margins. Stem slender, erect, 1ft. to 2ft. high. Ohio to Florida, 1725. (S. B. F. G. ser. ii. 36.)

P. g. suffruticosa (sub-shrubby).* *fl.* rose, disposed in a clustered, few-flowered, corymbose panicle; lobes of corolla ovate, entire. April. *l.*, upper ones broadly lanceolate, somewhat rigid, slightly pilose or glabrous. Stem more rigid than those of the type, smooth or scabrous, 2ft. high. South United States, 1834. (B. M. 1344 and S. B. F. G. 190, under name of *P. Carolina.*) SYN. *P. suffruticosa* (B. R. 68). *P. carnea* (B. M. 2155) is a smooth form.

Phlox—*continued.*

P. linearifolia (linear-leaved). *fl.* flesh-colour, corymbose; corolla tube slightly exceeding the calyx, the lobes obovate-cuneate, entire, rarely retuse. July. *l.* very narrow-linear, 1in. to 2in. long. Stem suffruticose at base, erect or adsurgent, slightly rigid. *h.* 9in. to 12in. Columbia River, &c., 1826. (B. R. 1351, under name of *P. speciosa.*)

P. longiflora (long-flowered). A synonym of *P. maculata candida.*

P. maculata (spotted).* *fl.* purple in the type, disposed in oblong-thyrsoid or sub-pyramidal panicles; corolla tube more or less incurved, the segments orbiculate, obtuse or retuse. July. *l.*, lower ones lanceolate, uppermost ones ovate, cordate at base, rather thick, glabrous or slightly scabrous. Stem erect, almost simple. *h.* 2ft. Pennsylvania, Iowa, and Florida, 1740. This species is very near *P. paniculata*, differing in its narrower oblong panicle and scarcely-pointed calyx lobes. The stems are dwarfer, and spotted with purple, and the flowers sweet-scented. The normal tint of the flowers is purple, but they vary in colour. Then there is the form with a more pyramidal inflorescence, called *P. pyramidalis* (S. B. F. G. 233). The garden varieties of this and *P. paniculata*, generally referred to in nursery catalogues under the name of *P. decussata*, are so blended and intermixed that it is now impossible to refer them to their respective species. Moreover, the typical plants are almost unknown out of botanical collections. Other forms are: *P. odorata* (S. B. F. G. 224), *P. penduliflora* (S. B. F. G. ser. ii. 46), *P. reflexa* (S. B. F. G. 232). *P. candida* is a white-flowered form, generally with a spotless stem. SYNS. *P. longiflora* (S. B. F. G. ser. ii. 31), *P. suaveolens.*

FIG. 114. PHLOX REPTANS.

P. Nelsoni (Nelson's). A form of *P. subulata.*

P. nivalis (snowy). A form of *P. subulata.*

P. ovata (ovate-leaved).* *fl.* reddish-purple, in small, terminal, crowded cymes, with undulated, retuse petals. Spring. *l.*, radical ones ovate, acute, rather fleshy; cauline ones ovate-oblong. *h.* 1ft. to 1½ft. North America, 1759. Plant erect, glabrous or nearly so, never viscid. (B. M. 528.) SYN. *P. triflora* (S. B. F. G. 293). *P. Carolina* is a taller form, with narrower, more tapering leaves, and pointed calyx teeth, approaching *P. glaberrima.* (B. M. 1344.)

P. paniculata (panicled).* *fl.* pink-purple, varying to white, in large, terminal, pyramidal-corymbose panicles; the segments of the corolla roundish; calyx teeth subulate setaceous. August. *l.* oblong-lanceolate and ovate-lanceolate, tapering at the base, or the uppermost more or less cordate. Plant erect, smooth, rough, or hairy. *h.* 3ft. to 4ft. United States, 1732. See Fig. 113. SYNS. *P. cordata* (S. B. F. G. ser. ii. 13), *P. corymbosa* (S. B. F. G. ser. ii. 114), *P. scabra* (S. B. F. G. 248).

P. p. acuminata (acuminate). A variety with the stems and under side of the leaves hairy; the latter are also broader and more pointed. (B. M. 1880.)

P. pilosa (pilose).* *fl.* pink, purple, rose, or sometimes white, in nearly sessile fascicles; corolla lobes ovate, entire. May. *l.* linear or lanceolate, short, villous, pilose or pubescent, sometimes

Phlox—*continued.*

glabrous. Stem erect, slender, 1ft. to 2ft. high. Carolina, 1759. A very elegant species. (B. M. 1307; L. B. C. 1251.)

P. p. amœna (pleasing). A synonym of *P. amœna.*

P. procumbens (procumbent). *fl.* lilac, with violet marks near the eye, disposed in terminal, few-flowered panicles, composed of one or two-flowered peduncles. Summer. *l.* lanceolate, acute, attenuated at the base, smoothish, ciliated on the edges. Stems procumbent, branched; branches downy. North America, 1827. This is regarded by Asa Gray as a hybrid between *P. amœna* and *P. subulata*; it is unknown as a wild plant. (L. B. C. 1722; S. B. F. G. ser. ii. 7.)

P. reptans (creeping).* *fl.* purple or violet, in few-flowered corymbs; tube of corolla 1in. long, limb about 1in. broad. Spring. *l.*, radical ones obovately-spathulate; cauline ones lanceolate. Alleghany region, 1800. Plant creeping, stoloniferous, downy. A neat and dwarf-growing species, with showy flowers. See Fig. 114. SYNS. *P. crassifolia* (L. B. C. 1596), *P. stolonifera* (B. M. 563; S. B. F. G. ser. ii. 293).

P. scabra (scabrous). A synonym of *P. paniculata.*

P. setacea (bristly-leaved). A synonym of *P. subulata.*

P. stolonifera (stolon-bearing). A synonym of *P. reptans.*

P. suaveolens (sweet-smelling). A synonym of *P. maculata candida.*

FIG. 115. FLOWERING BRANCH OF PHLOX SUBULATA.

P. subulata (subulate-leaved).* Ground or Moss Pink. *fl.* pinkish, with a darker centre, disposed in few-flowered corymbs; lobes of corolla wedge-shaped, notched. April. *l.* from ¼in. to ½in. long, awl-shaped, linear, pungent, ciliated. South New York to Florida, &c., 1786. See Fig. 115. (B. M. 411.) SYN. *P. setacea* (B. M. 415). Of this elegant and profuse-flowering, densely-tufted species, there are white forms in cultivation,

FIG. 116. FLOWERING BRANCHES OF PHLOX SUBULATA NIVALIS.

under the names of *P. aristata* (L. B. C. 1731), *P. Nelsoni*, and *P. nivalis* (see Fig. 116) (L. B. C. 780; S. B. F. G. 185).

P. s. frondosa (leafy). A very vigorous variety, with lilac-rose flowers. See Fig. 117. SYN. *P. frondosa.*

Phlox—*continued.*

P. suffruticosa (sub-shrubby). A synonym of *P. glaberrima suffruticosa.*

P. triflora (three-flowered). A synonym of *P. ovata.*

Varieties. These are very numerous, and are annually increased in number by the selection and naming of seedlings for distribution as improved forms in one or another particular. In gardens, they are generally divided into two sections, early-flowering and late-flowering, which are termed respectively *Suffruticosa* and *Decussata.* The latter have been chiefly obtained from *P. maculata* and *P. paniculata*; the other from *P. glaberrima suffruticosa.* Many of the varieties have flowers of the purest white, others vary much in colour; and almost all are exceedingly beautiful and effective. Varieties of *P. Drummondii* come true from seed, but it is not usual to keep them separately named, except for seed-production; they are generally mixed together before being sown. The following is a selection from the two sections to which reference has been made.

FIG. 117. PHLOX SUBULATA FRONDOSA, showing Habit and detached Flower and Leaves.

Early-flowering Varieties (*Suffruticosa* Section). ALLAN M'LEAN, rosy-purple; of finest form and quality. ANNIE LOCKHART, white, pink eye; large and fine. BEAUTY, white, rose eye; compact. BEAUTY OF EDINBURGH, pure white, with violet eye. BRIDESMAID, waxy-white; inflorescence large and compact. COUNTESS OF GALLOWAY, pure white, highly fragrant; finest form. DR. ROBERT BLACK, red, of finest quality; extra. DUCHESS OF ATHOLE, pure white, rosy-crimson eye; large and fine. GEORGE EYLES, rosy-purple; of fine form. HERCULES, rosy-purple; extra large flower. IDA, white, small rose eye; fine. LADY NAPIER, pure white, highly fragrant one of the best. LINNET, white, mottled rosy-lilac; distinct and good. MAGGIE LAUDER, white, violet eye. MALCOLM M'INTYRE, rosy-purple, dark eye. MISS ROBERTSON, pure white, dwarf; extra fine. MRS. CALDER, delicate white, with lilac eye; good dwarf habit. MRS. FORBES, white, shaded rose; fine form. MRS. GELLATLY, pure white, large eye. MRS. GREENSHIELDS, white, purple eye; fine. MRS. HUNTER, pure white, large bright crimson eye. MRS. JAMES ROBERTSON, pure white, rich violet eye; extra fine. MRS. P. GUTHRIE, white, dark lilac eye. MRS. RITCHIE, rose-purple. PAULINE, clear white, deep rosy-crimson eye; a fine variety. PEARL, pure white; good form, highly fragrant. PRESIDENT, rich red, brilliant. PRIMA DONNA, pure white; compact. REDBRAES, white, crimson eye. SOCRATES, white, dark purple eye. THE DEACON, deep rosy-purple. THE SHAH, rosy-purple, very large; one of the finest. VAN HOUTTE, rose, distinctly striped white; free. VENUS, beautiful mauve; fine form. WM. KIRKPATRICK, rose-purple, large deep rose eye; extra fine.

Late-flowering Varieties (*Decussata* Section). A. BORROWMAN, mauve; distinct. AYTON CASTLE, vermilion, large; extra.

Phlox—*continued.*

COCCINEA, rich vermilion; extra fine. COUNTESS OF ROSSLYN, snowy-white, rose eye. DAVID SYME, pure white, fine magenta eye. FLAMBEAU, dazzling amaranth, large flower; first-rate. GAVIN GREENSHIELDS, crimson, effective. GENERAL GORDON, light rosy-peach; very fine. GEORGE COUPAR, rich crimson self; fine form. GEORGE GOODFELLOW, deep rosy-crimson, with bright crimson eye; very large. GRAHAM MCCULLOCH, rich vermilion. HENRY CANNELL, mauve, rose centre; large and well formed. JAMES ALEXANDER, rich crimson self. JAMES COCKER, pure white, scarlet eye; fine. JAMES GRIEVE, crimson self, very bright, large flower and inflorescence. JANE WELSH, white, crimson eye; fine. JOHN FORBES, pink, dark crimson eye; large and good. JOHN HAMPTON, amaranth, large dense inflorescence. LOTHAIR, salmon-scarlet, dwarf; extra fine. MALCOLM DUNN, bright crimson, magenta eye; compact. MATTHEW MILLER, rich crimson self; dwarf. MRS. KEYNES, pure white; large and well formed, of great substance. MRS. LAING, soft rosy-lilac; dwarf, compact habit. MRS. SANDERSON, mauve, rose centre, large floret and inflorescence; extra. MRS. T. SPEEDY, white, shaded rose; distinct. OVID, white, shaded purple; large. PURPLE PRINCE, dark purple, maroon eye; very distinct. ROBERT LAIDLAW, crimson self; large and fine. SERAPH, white, red eye, neat flower; fine inflorescence. THE QUEEN, beautiful white, large; dwarf habit. THOMAS BOYD, rose-amaranth; fine form and substance. THOMAS CHISHOLM, pure white; dwarf, fine. TOM WELSH, bright red, compact, novel shade; first-rate. TRIOMPHE DU PARC DE NEUILLY, brilliant red; fine form. T. S. WARE, lilac, bluish centre; very distinct. VESUVIUS, bright crimson-scarlet, dark crimson eye. WHITE LADY, pure white; very fine and distinct. WM. VEITCH, white, shaded rose, dark crimson eye; one of the best.

FIG. 118. PHŒNIX DACTYLIFERA.

PHŒNICEUS. Deep red, with an admixture of scarlet or carmine.

PHŒNICOPHORIUM SECHELLARUM. A synonym of **Stevensonia grandifolia** (which *see*).

FIG. 119. PHŒNIX RECLINATA.

PHŒNIX (the old Greek name of the tree, used by Theophrastus). Date Palm. SYNS. *Elate*, *Fulchironia*, *Phoniphora*. ORD. *Palmæ*. A genus comprising about a dozen species of stove or greenhouse palms, natives of tropical and sub-tropical Asia and Africa. Flowers yellow, mediocre; spikes growing out from amongst the leaves, and bearing flowers of one sex only, the two sexes being upon different trees. Both kinds have a cup-shaped, three-toothed calyx, and a corolla of three petals, with their edges valvate in the male, and overlapping in the female; the former containing usually six (very rarely three or nine) stamens, with hardly any filaments, and narrow, erect anthers, and the latter three distinct ovaries, with sessile, hooked stigmas. Only one of the ovaries, however, comes to perfection, and ripens into a one-seeded, fleshy fruit, the seed being composed of horny albumen, with a groove down the front, and the embryo placed at the back. Leaves terminal, spreading and recurved, unequally pinnate; segments somewhat fascicled or almost equidistant, elongate-lanceolate or ensiform, acuminate, with entire margins. Trunks, when present, usually rising to a great height, and covered thickly with the scars of fallen leaves.

The species are readily raised from imported seeds, sown in a sandy soil, in a mild hotbed. After the seedlings have attained a sufficient size, pot off singly into small pots, using the same kind of soil in which the seeds were sown. For later shifts, good turfy loam will be better. In the South of France, many of the species are largely grown in the open air, to supply the demand in Paris, &c., for well-grown specimens for the decoration of apartments. The method pursued is this: the plants

Phœnix—*continued.*

are taken up, the soil shaken from the roots, packed in bundles, and forwarded to Paris, where each one is firmly placed in as small a pot as possible; they are then

FIG. 120. PHŒNIX RUPICOLA.

plunged in a mild hotbed in a warm house, which is kept shaded and syringed until new roots have formed, when shading is gradually removed, and the plants hardened off. By these means, much better specimens are more rapidly and cheaply obtained than would be possible under a system of pot-culture from the seedling stage onwards.

FIG. 121. PHŒNIX SYLVESTRIS.

Phœnix—*continued.*

P. acaulis (stemless).* *l.* pinnate, 1ft. to 3ft. or more long, spreading; pinnæ dark green, narrow, swollen at the base, the lower ones reduced to broad, flat spines. Stem very low, or entirely wanting. *h.* about 12ft. Central India, 1816. An ornamental, low palm, with a short, thick stem, like a bulb. It is valuable for decorative purposes.

P. dactylifera (date-bearing). Common Date Palm. *fl.*, male panicles white, compact, 6in. to 9in. long, on a short peduncle, the flowers sweet-scented; female spikes 1ft. to 2ft. long. *fr.* generally reddish or yellowish-brown when ripe, oblong, 1in. to 3in. long; pulp fleshy, sweet. *l.* grey, longer than those of *P. sylvestris*; pinnæ 8in. to 16in. long, regularly distichous, often approximate in twos or threes on the same side of petiole, which is grey, laterally compressed, almost flat. Trunk covered with the persistent bases of petioles, the foot often surrounded by a dense mass of root suckers. *h.* 100ft. to 120ft. (in this country, rarely over 30ft.). India, Levant, 1597. A handsome, erect-growing palm, the fruit of which is well known in this country as an article of luxury. In its native regions, nearly every part of this plant is applied to some useful purpose. See Fig. 118.

P. farinifera (mealy). *l.* pinnate, 3ft. to 4ft. long; pinnæ ovate-acuminate, about 6in. long, terminating in a sharp mucrone, the lower ones reduced to spines. *h.* about 7ft. East Indies, 1800. An elegant, compact-growing species.

P. leonensis (Sierra Leone). A synonym of *P. spinosa*.

P. Ouseleyana (Ouseley's). *fl.*, male spadices about 1ft., females 2ft. to 2½ft. long. *l.* 2½ft. to 3ft. long; pinnules entirely conduplicate, about 1ft. long, from the conduplication, about ⅕in. broad, subulate-acuminate; lowermost ones degenerated into short spines. Bulbous stems ovate, about 1ft. long and 6in. in diameter. India.

P. paludosa (marsh-loving). *fl.*, males yellow, spadix about 1ft. long; females greenish, spadix 1½ft. long. *l.* gracefully spreading, 8ft. to 10ft. long; pinnules bifarious, solitary, spreading, then curved downwards, not rigid, 2ft. long, eight lines wide, exceedingly acuminate, the lowest longest and narrowest; petioles covered with brownish, glaucescent scurf. Trunk 12ft. to 15ft. high, 3½in. in diameter, annulate at base, otherwise covered with brown, armed petioles. India.

P. reclinata (leaning).* *l.* pinnate; pinnæ linear, somewhat triangular and spreading. Stem becoming stout with age.

Phœnix—*continued.*

h. about 50ft. South-east Africa, 1792. A fine and large-growing species. See Fig. 119.

P. rupicola (*rock-loving*).* *l.* pinnate, arching, spreading, having a slender rachis and very short petiole, which is dilated at the base, and partially encircles the growing point; pinnæ long, narrow, about 6in. in length, finely arched, the lower ones reduced to spines. *h.* 15ft. to 20ft. India, 1873. The handsomest species in the genus. See Fig. 120.

P. spinosa (spiny). *fl.*, male peduncles 4in. to 8in. long. *fr.* about ½in. long, ovate-cylindrical, brownish. *l.*, pinnæ linear-lanceolate, acuminate, pungent-pointed, unequidistant, aggregated or scattered, ten to twelve lines wide at their broadest part. Trunk 6ft. to 10ft., or rarely 30ft. in height, soboliferous. Western tropical Africa. SYN. *P. leonensis.*

P. sylvestris (sylvan).* East Indian Wine Palm; Wild Date. *fl.* similar to those of *P. dactylifera*. *fr.* green at first, reddish-yellow when ripe, 1in. long. *l.* greyish-green, 7ft. to 12ft. long; pinnæ very numerous, 6in. to 18in. long, alternate and opposite, not fascicled; petiole compressed in the leaf-bearing part, brown at base. *h.* 40ft. India, 1763. One of the hardiest. See Fig. 121.

FIG. 122. PHŒNIX TENUIS.

P. tenuis (narrow).* A recent, but very elegant, addition to the genus; it resembles *P. dactylifera* in general appearance, but is more slender and finer in all its parts. Habitat unknown. See Fig. 122.

PHOLIDOCARPUS (from *pholis, pholidos*, a scale, and *karpos*, fruit; the fruit is covered with a scaly coat). ORD. *Palmæ.* A genus, of doubtful affinity, of two species of stove palms, natives of the Malayan Archipelago. *P. Ihur*, the only species in cultivation, thrives in a compost of turfy loam and leaf mould.

P. Ihur (Ihur). Spadix loosely branched. Drupe ovoid, three or four-seeded, as large as a medium-sized hen's egg, with a rugose, tesselated rind. *l.* like those of *Borassus flabelliformis*; petioles armed with robust spines.

PHOLIDOPHYLLUM. A synonym of *Cryptanthus.*

PHOLIDOTA (from *pholis*, a scale, and *ous, otis*, an ear; alluding to the scaly, ear-like bracts of the spike). Rattlesnake Orchid. SYNS. *Chelonanthera* (in part), *Crinonia, Ptilocnema.* ORD. *Orchideæ.* A genus consisting of about a score species of stove orchids, with creeping, branched stems or rhizomes, or with one or two-leaved pseudo-bulbs; they are natives of India and the Malayan Archipelago, extending as far as Southern China. Flowers small, shortly pedicellate, in terminal racemes; sepals carinate-concave, erect or spreading; petals usually smaller, slender, flat; lip sessile at the base of the column, concave and sub-baccate at base, three-lobed; column sometimes very short; bracts ovate, imbricated, and persistent, or narrower and deciduous. The species are of no particular horticultural value. Those given below require culture similar to **Cœlogyne** (which *see*).

P. clypeata (shield-flowered). *fl.* resembling those of *P. imbricata*, but arranged in a spike not more than 3in. long; column resembling a three-lobed petal, bordered with brown, imparting to the flower the appearance of having two lips. Pseudo-bulbs about 2in. long, each with a dark green leaf. *h.* 6in. Borneo, 1847.

P. imbricata (imbricated). *fl.* yellowish, with a dash of violet, freely produced on pendulous spikes as long as the leaves; lateral sepals ovate, carinate; lip sub-globose, cucullate, with the intermediate lobe bilobed; bracts concave, pointed. *l.* solitary, oblong-lanceolate, plicate, acute. Pseudo-bulbs oblong, corrugate-sulcate, obtuse. *h.* 1ft. East Indies, 1824. (B. R. 1777; H. E. F. 138; L. B. C. 1934.)

P. pallida (pale). *fl.* white, smaller than in *P. imbricata*; bracts very round, blunt. *l.* also smaller. *h.* 6in. India, 1828. (B. R. 1213.)

PHOMA. *See* **Sphæropsideæ.**

PHONIPHORA. A synonym of **Phœnix** (which *see*).

PHORMIUM (from *phormos*, a basket; referring to the uses made of the fibre). Flax Lily, or New Zealand Flax. SYN. *Chlamydia.* ORD. *Liliaceæ.* A small genus (two species) of nearly or quite hardy, rigid herbs, with fleshy, fibrous roots, natives of New Zealand. Flowers dull red or yellow, large, panicled, erect, jointed on the pedicel; perianth tubular, curved, of six leaflets, the inner with spreading tips; stamens six, exserted; scapes leafless, variable in height, from 5ft. to 15ft., branched and bracteate. Leaves radical, linear-ensiform, distichous, coriaceous, very tough. The species and varieties are of easy culture in rich, loamy soil. They are well adapted for greenhouse decoration, for use as sub-tropical plants in summer, and, in the southern parts of the country, are sufficiently hardy to grow, uninjured, outside; they are however, more safe, if protected, in frosty weather, with some covering. In a greenhouse, the long, erect, sword-like leaves of New Zealand Flax are very distinct, when the plants are associated with others. Large specimens, in pots or tubs, have a very fine appearance in conservatories, or when placed, during summer, in prominent positions in the flower garden. Propagated, in spring, by division of the crowns before growth commences; also by seeds.

P. Colensoi (Colenso's). A synonym of *P. Cookianum.*

FIG. 123. PHORMIUM COOKIANUM, showing Habit and Portion of detached Inflorescence.

P. Cookianum (Cook's).* Small Flax Lily. *fl.* yellow, or with the outer segments greenish, 1in. to 1½in. long; inner segments acuminate, reflexed; scapes 3ft. to 6ft. high. Summer. *l.* 2ft. to 3ft. long, more acuminate than in *P. tenax* (than which this species is smaller in all its parts), rarely split at the top. 1868. SYNS. *P. Colensoi, P. Forsterianum.* See Fig. 123.

P. C. variegatum (variegated).* *l.* narrowish, erect, pointed, lanceolate, coriaceous, dark green, elegantly banded at the margin with one, or sometimes two, narrow stripes of creamy-

Phormium *continued.*

white. A beautiful, variegated-leaved plant, altogether smaller and more elegant than *P. tenax*. (R. H. 1878, 56.

P. Forsterianum (Forster's). A synonym of *P. Cookianum*.

FIG. 124. PHORMIUM TENAX, showing Habit and detached Flower.

P. tenax (tough).* Common New Zealand Flax. *fl.* yellow or red, but variable, 2in. long. August. *l.* from 3ft. to 6ft. or more in length, rigid, erect, dark green, with a narrow, reddish-brown margin, and always split at the tip when old. 1798. The hardier of the two species. See Fig. 124. (B. M. 3199.) The following are some of the best forms:

P. t. atro-purpureum (dark purple). *l.* wholly of a beautiful purple, suffused with a reddish tinge. A handsome form, differing from the type only in the colour of its leaves.

P. t. nigro-pictum (black-spotted). *l.* deep green, about 2ft. long and 1¼in. wide, narrowly edged with blackish-purple, the edge becoming broader and more distinct on the base, where it forms a conspicuous, zigzag line, elegantly spread out as the plants become mature. A compact-growing form, much dwarfer in habit than the type, and smaller also in the foliage.

P. t. variegatum (variegated).* *l.* dark green, striped with rich yellow and white, often 6ft. in length. New Zealand. A very pretty, striped form of the common species.

P. t. Veitchianum (Veitch's). A fine form, with shorter and narrower leaves, which are of a bright pea-green, and have broad stripes of a creamy-white, extending the entire length of each leaf.

PHORODON HUMULI. This insect, known also as the Hop Aphis, is frequently most destructive to the Hop-plants, where these are cultivated on a large scale; but in gardens it does little harm, though occasionally hurtful to Hops grown for ornamental purposes. It belongs to the green group of Aphides, and the genus differs very little from the other Green Flies in appear-

Phorodon Humuli—*continued.*

ance. Many efforts have been made to combat this pest in the Hop-gardens. One remedy is to wash the plants thoroughly, with the help of a garden engine, with a solution of 3lb. or 4lb. of soft soap in 200 gallons of water, adding a little infusion of coarse tobacco to the solution if thought fit; another is furnished by a newly-discovered emulsion of petroleum, which is said to be very effective. In gardens, it is only necessary to look occasionally to the young shoots, and to crush the Aphides before they become numerous.

What is regarded by most entomologists as a variety of this insect (*P. Humuli*, var. *Mahaleb*) occurs in gardens on leaves of Plums, and also lives on Sloes. Among the most useful assistants in reducing the ravages of these, as well as of other Aphides, are the larvæ of Ladybirds (*Coccinella septempunctata*, &c.), of Golden-eyed Flies (*Chrysopa*); and of Hawk-flies (*Syrphus*).

PHOSPHATES OF LIME. Chemical substances which contain the elements calcium and phosphorus, both of which are found to be present in all plants. The ash which remains when the plants are burned invariably contains them in greater or less amount. Experiments on plants which are supplied with food of definite and strictly-ascertained composition, have proved that when either of these elements is withheld, the plants remain small and stunted, though the other elements required in the food are all supplied. On adding the missing element to the food, growth begins, and goes on in a healthy way. But, though this has been ascertained, there is still much uncertainty as to the way in which each of these elements exerts its beneficial action on plants. It is believed that calcium is of use both in enabling plants to obtain the sulphur and phosphorus that they require more readily in combination with it (in sulphate of lime and Phosphates of Lime) than these elements could be otherwise supplied to them, and in combining with oxalic acid, which is largely formed in growing tissues of plants, but is hurtful to them in excess. The calcium unites with this to form oxalate of lime, in the shape of small crystals, called "raphides," which are very common in the cells of many plants—in some resembling bundles of minute needles; in others, in the form of cubes; in others, like balls, studded over with sharp points. Oxalate of lime is harmless to plants. Phosphorus is believed to be of value chiefly in helping to form protoplasm, and to transfer it from place to place, as needed for growth in the plants. Phosphates are employed chiefly to supply phosphorus, and they are drawn from the soil by the plants as they require it. There are several Phosphates that contain calcium. They differ from one another in the percentage of calcium that they contain, and also in their solubility; but, for a discussion of their composition and preparation, the reader

Phosphates of Lime—*continued.*

is referred to works on chemistry, such as Miller's "Elements of Chemistry," or Johnston and Cameron's "Elements of Agricultural Chemistry and Geology." Soils generally contain a small quantity of the Phosphates of Lime, but not enough for the requirements of cultivated plants, as each crop removes some of the small supply, which, in time, becomes exhausted. Hence, it is necessary to add to the soil new supplies of Phosphates; and this is largely done by means of artificial manures. The chief sources of Phosphates are bones and coprolites, which latter are hard, grey or brown, rounded pebbles, abundant in certain localities in England. They were formerly believed to be the fossilised dung of animals (from the Greek word *kopros*, dung). They are probably the fragments of bones of great reptiles that lived in the period to which the rocks and strata (Greensand) in which they are found belong. There are also other less important sources of the mineral. The Phosphate contained in bones and in coprolites is not soluble in pure water, but is so in acetic acid and in the stronger acids. Experiments show that various substances insoluble in water are rendered soluble by contact with the roots of plants, probably by means of the excretion of an acid from them. Bone Phosphate is acted on in this way, and the effect is largely increased when the bones or minerals are in a finely-powdered state. Bone-dust, prepared by grinding bones, after they have been steamed, to remove the animal matter, and thus render them more easy to reduce to powder, and ground coprolites and mineral Phosphates, are now largely used as manures. In this form, the Phosphates have the advantage of remaining in the soil for a considerable time, until absorbed by the roots of plants; hence, their action is spread over more than one year. It is, however, frequently desired to allow plants to absorb them more rapidly than can be done where the roots have to render the Phosphates soluble. To permit of this, the Soluble Phosphate, or Superphosphate of Lime is made use of. It is prepared by subjecting bones, or a mixture of bone-ash and mineral Phosphates, to the action of sulphuric acid (oil of vitriol), in the proportion of about three parts of the Phosphates to two of acid. The commercial Superphosphate is a somewhat indefinite substance, composed of the soluble Phosphate of Lime in large proportion, along with small quantities of the insoluble Phosphates and a good deal of sulphate of lime. The soluble Phosphate readily dissolves in water, and plants obtain it in larger proportion the first season after it is put on the soil; but it is liable to be washed out of the soil by rain: hence, its effects are not lasting. It should be mixed with two or three times its bulk of ashes or mould before sprinkling it on the soil. It is asserted by Mr. Jamieson, as the result of his experiments, that Superphosphate of Lime favours the development of "Finger-and-Toe" (the work of *Plasmodiophora Brassicæ*) in Turnips; but this is denied by others, who advocate its use.

PHOSPHORUS (from the Greek words *phos*, light, and *phoreo*, I bear; in allusion to its being luminous in the dark). One of the chemical elements found in all living beings. It always occurs, in nature, combined with several other elements, and cannot remain in its usual form exposed to the air without undergoing change, since it unites with one of the gases (oxygen) that make up the air. A well-known, nearly inert modification of Phosphorus in the air is that made use of to tip the ends of lucifer matches.

Phosphorus—*continued.*

There is still much uncertainty regarding the use or uses of Phosphorus in plants, but it is believed that it aids in building up the protoplasm, or actual living substance, of the bodies of both plants and animals, as well as in the transference of the protoplasmic substances from the cells in which they are formed to the parts in which they are to be employed, in supplying food to old tissues, or in forming new cells. The combinations in which plants obtain the supply of Phosphorus necessary for them are almost wholly the phosphates of lime; of which several exist, differing among themselves in the percentage they contain of the aliment calcium (which is the base in lime), and in their solubility in water. *See* **Phosphates of Lime.**

PHOTINIA (from *photeinos*, shining; in reference to the leaves). Including *Eriobotrya*. ORD. *Rosaceæ*. A genus comprising about a score species of half-hardy, evergreen shrubs or trees, natives of the mountains of India, China, and California. Flowers frequently white, disposed in terminal corymbs or panicles; calyx with a campanulate or turbinate tube and five ovate, obtuse lobes; petals five, spreading; stamens about twenty. Drupe or berry ovoid, in some species edible, one to five-celled, the cells one or two-seeded. Leaves alternate, short or long-stalked, coriaceous, simple, entire or serrate; stipules sometimes almost leaf-like. Photinias are very handsome-leaved shrubs for sheltered situations, and for culture against walls. In cold parts of the country, and during severe weather, some protection is essential. They prefer a rather light, loamy soil, and do not succeed well if it is very stiff. Propagated by cuttings of side shoots, 2in. or 3in. long, inserted in sandy soil, under a bell glass; also, in the open air, in April, by cleft-grafting, close to the ground, on stocks of common Quince. These may be procured from cuttings or layers. *P. japonica* is most commonly seen in cultivation.

FIG. 125. FRUITING BRANCHLET OF PHOTINIA JAPONICA (much reduced).

P. arbutifolia (Arbutus-leaved). Californian Maybush. *fl.* white, disposed in an elongated panicle; petioles and young branches

Photinia—*continued.*

bright red. July. *l.* oblong-lanceolate, acute, distinctly serrated. *h.* 10ft. to 20ft. California, 1796. Tree. SYN. *Cratægus arbutifolia.* (B. R. 491.)

P. elliptica (elliptic). *fl.* white; thyrse compound, terminal, clothed with fulvous tomentum. *fr.* yellow, downy. *l.* flat, elliptic, toothed, tomentose beneath. *h.* 30ft. Nepaul, 1823. Tree.

P. japonica (Japanese).* Japan Medlar; Japan Quince; Loquat. *fl.* white, in pendulous racemes. Autumn. *fr.* about the size of a small apple, pale orange-red, downy, in large bunches. *l.* large, oblong, rugose, downy beneath. *h.* 10ft. to 20ft. Japan, 1787. A handsome shrub or tree, producing edible fruit when grown under cover. It is sufficiently hardy to withstand the cold of an ordinary English winter, but an unusually severe frost is fatal to it. From the late period of its flowering, the fruits are scarcely ever produced here in the open air, although, in the South of France, considerable quantities are annually secured. This species, like its congeners, is peculiarly well adapted for wall culture as an ornamental, flowering shrub. See Figs. 125 and 126. (B. R. 365.)

FIG. 125. PHOTINIA JAPONICA, showing Inflorescence and Single Fruit.

P. serrulata (toothed).* Chinese Hawthorn. *fl.* white, small, in terminal, flat corymbs. April to July. *l.* large, Laurel-like, coriaceous, oblong, acute, serrulated. *h.* 10ft. to 20ft. Japan and China, 1804. A handsome shrub. SYN. *Cratægus glabra.* (B. M. 2105; L. B. C. 248.)

PHOTINOPTERIS. Included under *Acrostichum.*

PHRAGMIDIUM (from the Greek *phragmos*, a fence; in allusion to the partitions between the numerous cells in each spore). A small genus of Fungi, belonging to the group popularly known as Brands, or in science as *Uredineæ.* The species best known to gardeners are those that cause the Raspberry Brand (*P. Rubi-Idaei*, Pers., or *P. gracile*, Grev.) on wild and on garden Raspberries, and Rose Brand (*P. mucronatum*) on Rose-leaves. In all the species of *Phragmidium*, the Fungus appears on the green parts, especially on the leaves, in the form of small spots, usually very numerous, on the lower surface. The leaf is, in some plants (*e.g.*, Bramble), discoloured around the spots; in others (*e.g.*, Raspberry), it is not discoloured. The Fungus is, at first, yellow, and the spots are seen, with the aid of the microscope, to be made up of masses of globular, or angular, yellow cells or spores. In this stage, the species of *Phragmidium* used to be referred to the genus *Lecythea.* As the Fungus matures, the spots become dark brown or black, and the spores then present are much larger than those produced in the previous stage. Each consists of a single row of cells, from three to ten in number. They are very dark brown when mature, and are supported on slender footstalks. The species on Raspberry has eight to ten cells

Phragmidium—*continued.*

in the spore. The Fungus, as observed on the leaves, is reproducing the species, and the spots are masses of spores formed at certain places; but the more important part is the mycelium, which grows among, and feeds on, the tissues of the host-plant. The Brands of this genus are, as a rule, not very hurtful to cultivation, though both the above, viz., Rose Brand (*P. subcorticium*, Schr., or *P. mucronatum*, Fr., with six to eight-celled spores) on Roses, and *P. Rubi-Idaei* on Raspberry, are common. The only remedy is to remove and to destroy all the diseased leaves, by burning or by digging into the soil.

PHRATORA VITELLINÆ (the Willow-leaf Beetle). A small beetle, elliptical in form, but flattened, about $\frac{1}{6}$in. or $\frac{1}{4}$in. long by $\frac{1}{10}$in. broad, and deep blue or metallic green in colour. The wing-cases are marked lengthwise with rows of dots. The beetles and their larvæ feed on the leaves of Willows and of Poplars, gnawing the tissues of the leaf from below till only the network of veins is left, with the thin, transparent membrane of the upper surface stretched upon it. The larvæ are rather long in the body, with six true legs on the front part. The head is black, the body whitish or yellowish, with black marks on the back, and black spots on the sides. They become pupæ in the soil. There are usually two broods in a year, and the beetles of the second hybernate, protected under loose bark, or among rubbish on the ground near the plants. All sorts of Willows and Poplars are liable to injury from this insect.

Remedies. The larvæ may be shaken off the leaves, upon anything spread to receive them, and should be collected and destroyed. The mere shaking them off while immature is of use, as many fail to find their way back to the trees; but such a proceeding would do little harm to the mature larvæ, which are ready to burrow into the earth. In some parts of the country, the Willow-growers have their trees hand-picked or shaken over vessels containing a little paraffin. Others make use of Paris green, in suspension, in water, about $\frac{1}{2}$lb. to 1lb. being used in 40gals. of fluid; this must be sprinkled over the plants. The hybernating beetles should also be removed in the loose bark and surface rubbish, and all the rubbish in which they lie should be burned. In various parts of the country, the Osiers were threatened with destruction till Paris green was employed as a remedy.

PHRYMA (a Linnæan name of unknown meaning; said to be of American origin). Lopseed. SYN. *Leptostachya.* ORD. *Verbenaceæ.* A monotypic genus. The species is a hardy, herbaceous perennial, of no great horticultural merit. It thrives in almost any soil. Increased by division; or by seeds, sown in the open ground, in spring.

P. Leptostachya (Leptostachya). *fl.* purplish, inconspicuous, sessile, in much-elongated spikes, each in the axil of a setaceous bract, and subtended by a pair of minute bractlets, at length strictly reflexed. August. *l.* ovate, acuminate, coarsely serrated; ower ones on long petioles. *h.* 2ft. to 4ft. Central Asia, North America, &c., 1802.

FIG. 127. PHYGELIUS CAPENSIS.

PHRYNIUM (from *phrynos*, a toad; referring to the genus inhabiting marshes). SYN. *Phyllodes.* ORD. *Scitamineæ.* A genus containing nearly twenty species of stove, herbaceous perennials, natives of the East Indies, the Malayan Archipelago, and tropical Africa. Flowers in terminal heads or panicles; sepals three, narrow; corolla shorter, or scarcely longer, than the calyx; lip broad, transversely crested, cucullate, or sometimes two-lobed. Leaves sub-radical, on long stalks. Stems leafy. Roots creeping. Few of the species are grown in gardens. For culture, *see* **Calathea**, under which are included two or three species usually known as Phryniums.

Phryniums—*continued.*

P. coloratum (coloured). A synonym of *Calathea colorata.*

P. eximium (choice). A synonym of *Calathea eximia.*

P. maculatum (spotted). A garden synonym of *Dracæna phryniodes.*

P. sanguineum (bloody). *fl.* rich blood-colour; outer sepals free to the base, erect; inner ones combined for a good part of their length; scape 1ft. to 1½ft. long, erect, terminated by a compound raceme. Winter and spring. *l.* 10in. to 12in. long, oblong, acuminate, dark green above, rich purple below, on short petioles. Native place unknown. 1845. Plant stemless or caulescent. (B. M. 4646.)

PHUOPSIS (from *Phu*, and *opsis*, resemblance; alluding to the similarity in the plants). ORD. *Rubiaceæ.* A monotypic genus. The species is a hardy, slender herb, with a perennial root, and a slender, elongated stem. For culture, *see* **Crucianella.**

P. stylosa (large-styled).* *fl.* pink, hermaphrodite, capitate, involucrate, bracteate and bibracteolate; calyx with an obovoid tube and an obsolete limb; corolla tubular-funnel-shape, with five oblong-ovate, obtuse, valvate lobes. July. *l.* in whorls of six to eight, sessile, narrow-lanceolate, acuminate; margins spiny-ciliate. *h.* 1ft. Caucasus, 1836. (B. R. 1838, 55, under name of *Crucianella stylosa.*)

PHYCELLA. Included under *Hippeastrum.*

PHYGANTHUS. A synonym of **Tecophilæa** (which *see*).

PHYGELIUS (from *phyga*, flight, and *helios*, the sun; said to love shade). ORD. *Scrophularineæ.* A genus comprising only a couple of species of erect, very glabrous, South African shrubs. Flowers scarlet, showy, on recurved pedicels; calyx of five imbricated segments; corolla with an incurved or slightly erect, elongated tube, and a limb of five round, spreading lobes; peduncles loosely cymose, three to seven-flowered, disposed in a terminal, secund panicle. Leaves opposite, stalked, crenulate; floral ones reduced to bracts; the uppermost ones alternate. *P. capensis*, the only species introduced, thrives in a light, rich, loamy soil. Seeds, which are abundantly produced, should be sown in a slight hotbed, in spring, and the seedlings afterwards transplanted to a warm, sunny border. The species may also be increased by cuttings.

P. capensis (Cape).* Cape Figwort. *fl.* scarlet; corolla 1¼in. long; tube constricted at base above the ovary, slightly enlarged above; peduncles opposite, or the upper ones alternate. Summer. *l.* ovate or ovate-lanceolate, 2in. to 3in. long. Branches rather thick, sub-tetragonal, smooth. *h.* 3ft. 1865. A showy plant. See Fig. 127. (B. M. 4881; F. d. S. 1111; R. G. 227.)

PHYLICA (from *phyllikos*, leafy; alluding to the abundant evergreen foliage). Including *Soulangia* and *Trichocephalus.* ORD. *Rhamneæ.* A genus comprising about sixty-five species of greenhouse, evergreen shrubs, rarely trees, often Heath-like, tomentose or pubescent; they are very numerous in extra-tropical and South Africa, and rare in Tristan d'Acunha and Madagascar. Flowers small, axillary, or in very densely crowded heads or spikes, shortly pedicellate, bracteate or ebracteate, very rarely loosely cymose; calyx with an obconical, urceolate, or cylindrical tube and five lobes; petals five, cucullate or setiform, or absent. Fruit pisiform, dead black. Leaves coriaceous, often small, alternate, thick, very rarely large, frequently white-tomentose beneath; margins entire, recurved or revolute. The species mentioned below are all South African shrubs. They thrive in sandy peat, and succeed best in a greenhouse temperature. Propagated by cuttings of half-ripened shoots, inserted in sandy soil, under a bell glass, in a warm greenhouse.

P. buxifolia (Box-leaved). *fl.* greenish, disposed in heads at the tips of the branches. May to September. *l.* ovate, spreading, smooth above, but covered with hoary down on the under surface. *h.* 6ft. 1759. SYN. *Soulangia buxifolia.* (L. B. C. 848.)

P. capitata (headed). *fl.* white, disposed in roundish heads about the size of a chestnut. May to August. *l.* linear-lanceolate, somewhat villous; lower ones reflexed, smooth; floral ones very villous, spreading a little. *h.* 2ft. 1800. (B. R. 711.) SYNS. *P. plumosa* (L. B. C. 253), *P. pubescens* (of Aiton).

Phylica—*continued.*

P. ericoides (Heath-like). *fl.* pure white, disposed in hemispherical heads. April to September. *l.* linear-lanceolate, rather blunt, spreading, smooth, downy beneath. Branches somewhat umbellate. *h.* 3ft. 1731. (B. M. 224.)

P. plumosa (feathery). *fl.* whitish; bracts villous or feathery, forming a beautiful plume at the tips of the branches. Autumn. *l.* linear-lanceolate or lanceolate, awl-shaped, smooth above, hairy beneath, with revolute margins. *h.* 1ft. to 2ft.

P. p. squarrosa (squarrose).* *fl.* white, disposed in roundish heads; calyx segments erect, acute. August to November. *l.* linear-lanceolate, spreading, villous and hoary on the under surface; lower ones rather smooth; floral ones longer than the rest, spreading. *h.* 2ft. 1800. (L. B. C. 36.) SYN. *P. pubescens* (L. B. C. 695).

P. plumosa (feathery), of Loddiges. A synonym of *P. capitata.*

P. pubescens (downy), of Aiton. A synonym of *P. capitata.*

P. pubescens (downy), of Loddiges. A synonym of *P. plumosa squarrosa.*

P. rubra (red). *fl.* red, disposed in terminal heads. December. *l.* lanceolate, acute; under surface downy. *h.* 3ft. 1827. SYN. *Soulangia rubra.* (B. R. 1498.)

P. spicata (spike-flowered). *fl.*, perianth white, small, thick, and fleshy; spike about 2in. long. August. *l.* scattered, rather remote, all but the upper ones patent, or even reflexed, linear, somewhat acute, semi-cylindrical, the margins revolute; upper ones passing into bracts. A small, slender shrub.

P. stipularis (stipular). *fl.* white, disposed in terminal, sessile heads; bracts short, naked, usually bifid. May to September. *l.* alternate, lanceolate-linear, slightly acute, smooth above, hoary-velvety beneath, with revolute edges. *h.* 3ft. 1786. SYN. *Trichocephalus stipularis.*

PHYLLAGATHIS (from *phyllon*, a leaf, and *agatheos*, divine; referring to the beauty of the foliage). ORD. *Melastomaceæ.* A genus comprising only a couple of species of handsome, very thick, herbaceous, small stove shrubs, with short stems, restricted to the Malayan Peninsula and Islands. Flowers pink, in short, pedunculate, densely crowded heads; calyx tube oblong or turbinate-campanulate; lobes three or four, ovate, acute, as are also the four, rarely three, petals; bracts ample, involucrate. Leaves opposite, or solitary and terminal, large, petiolate, orbiculate, cordate at base, obtuse, entire or denticulate, seven to nine-nerved, shining above, discoloured beneath; petioles often hairy within. *P. rotundifolia* requires a very moist and warm atmosphere. It thrives best in a compost of peat and sand, to which may be added a little leaf mould. Propagated by leaf-cuttings, which should be kept in a close frame in the stove until well established.

P. gymnantha (naked-flowered). *fl.* pink, disposed in a compact head; petals obliquely bilobed; peduncles springing from the upper axils, tinged with red below. *l.* ovate, seven-nerved, cordate at base, bright glossy green, ciliated on the margins. Stem short, erect. Borneo, 1884.

P. rotundifolia (round-leaved). *fl.* pink, densely crowded in axillary, pedunculate heads, each of which is involucrated by bracts. July. *l.* opposite, large, roundish, 6in. to 9in. long, 4in. to 6in. wide; the upper surface plaited and shining, of a rich, deep, metallic green, slightly tinged with red; the under side dark red, with very prominent ribs. Stem square, stout. *h.* 1ft. to 2ft. Sumatra. The beauty of this species is confined to the leaves. (B. M. 5282.)

PHYLLAMPHORA. A synonym of **Nepenthes** (which *see*).

PHYLLANTHUS (from *phyllon*, a leaf, and *anthos*, a flower; because the flowers, in some species, are produced on the edges of the leaf-like branches). Including *Bradleia*, *Cicca*, *Kirganelia*, *Xylophylla*, and many others formerly regarded as distinct genera. ORD. *Euphorbiaceæ.* A vast genus (about 450 species have been enumerated) of mostly stove herbs, shrubs, or trees, of various habit, broadly dispersed over the tropics, but rare in temperate regions. Flowers small, monœcious, very rarely diœcious, apetalous, axillary or rarely in the nodes of leafy branchlets; sepals six, five, or rarely four, distinct or rarely shortly connate at base, imbricate, more or less distinctly biseriate. Leaves entire, alternate or rarely opposite, generally distichous, and so arranged in opposite rows along the smaller branches as to give them the appearance of pinnate leaves. This

Phyllanthus—*continued.*

genus contains but few species of any horticultural value, those undermentioned being exceptional. A compost of sandy loam and fibry peat, to which is added a small quantity of broken bricks, charcoal, and dried cow-dung, is most suitable for their culture. Propagated by cuttings of the hard shoots, inserted in a sandy soil, in heat. The species described below require stove treatment, except where otherwise stated.

FIG. 128. BRANCH OF PHYLLANTHUS ANGUSTIFOLIUS.

P. angustifolius (narrow-leaved). *fl.* fasciculate, as long as the pedicels; calyx red. July. Stem 2ft. high. Branches deciduous, compressed; branchlets distichous, lanceolate-linear or lanceolate, serrulated from above the base, striate-veined. Jamaica, 1789. Shrub. See Fig. 128. (B. M. 2652, under name of *Xylophylla montana*; L. B. C. 1091, under name of *Xylophylla elongata.*)

P. atropurpureus (dark purple). *l.* rich dark purple, bluntly ovate. Stems terete. South Sea Islands, 1876. Shrub. In habit and aspect, this species is the counterpart of *P. nivosus*; it is deciduous during the resting season, and puts forth its new leaves, which, at first, are of a dark green colour, but the purple hue is soon developed under the influence of light, in which rich colour the plant becomes robed. It forms a slender-growing subject.

P. Chantrieri (Chantrier's).* *fl.*, males in clusters of two or three, sometimes solitary, brick-red, fringed with pale yellow hairs; females larger than the males, solitary towards the tips of the branches. Summer. Branches forming a right angle with the stem, and having the aspect of pinnate leaves, glossy green. Cochin China, 1882. An elegant shrub, of symmetrical habit. See Fig. 129. (R. H. 1883, p. 557.)

P. falcatus (sickle-shaped). *fl.* glomerate; calyx red. July. Stem 6ft. high. Branches deciduous, cylindrical; branchlets falcate or linear-falcate, serrated above, striate-veined, 4in. to 5in. long. West Indies, 1699. Shrub. (B. R. 373, under name of *Xylophylla falcata.*)

P. nivosus (snowy). *l.* ovate, alternate, frequently entirely covered with a mottling of white, but, in some cases, partially veined with green. Stem terete. South Sea Islands, 1873. A very desirable shrub, of a free-branching habit; when well developed, it has the appearance of a sheet of snow. (F. M. n. s. 120; I. H. 332.)

P. pallidifolius (pale-leaved).* *fl.* yellow, red at the base; peduncles bright red, those of the males on the lower axils, solitary or few together, those of the females towards the ends of the branches, stouter, solitary. Summer. *l.* broadly oblong, blunt at both ends, apiculate, glabrous, glaucous beneath;

Phyllanthus—*continued.*

petioles very short. Java. A small and very ornamental shrub. SYN. *Reidia glaucescens* (B. M. 5437).

P. salviæfolius (Salvia-leaved). *fl.*, males greenish, small, on long, filiform pedicels; females tinted with red, larger, on short pedicels. Summer. *l.* close-set, distichous, sub-sessile, ovate-oblong, pubescent above, tomentose beneath. Branches much spreading. New Grenada, 1883. Greenhouse shrub. See Fig. 130. (R. H. 1883, 34-36.)

FIG. 129. PHYLLANTHUS CHANTRIERI.

P. Seemannianus (Seemann's). *fl.* whitish, inconspicuous but curious, axillary. Branches long, leaf-like, bearing shortly-stalked, alternate leaves. *h.* 2ft. New Hebrides, 1879. An interesting, erect shrub.

FIG. 130. PHYLLANTHUS SALVIÆFOLIUS.

P. speciosus (showy). *fl.* fasciculate; calyx whitish; pedicels three or four times as long as the flowers. September. Stem

Phyllanthus—*continued.*

6ft. to 8ft. high. Branches deciduous, cylindrical or sub-compressed; branchlets 2in. to 3in. long, distichous, lanceolate, striated only by the principal, somewhat distant veins. Jamaica, 1818. Shrub. (B. M. 1021, under name of *Xylophylla latifolia*).

PHYLLARTHRON (from *phyllon*, a leaf, and *arthros*, a joint; in allusion to the leaflets, which were considered to be jointed to the leaf-stalk). SYN. *Arthrophyllum*. ORD. *Bignoniaceæ*. A genus comprising about five species of glabrous, stove trees, confined to Madagascar. Flowers disposed in short, sub-sessile cymes at the tips of the branches; calyx campanulate, very shortly or acutely five-toothed; corolla tube enlarged above; limb sub-bilabiate, the lobes all ample, rotundate, spreading. Fruit one-valved; seeds almost round. Leaves opposite, whorled, or scattered two to five from the joints, oblong-cuneate or almost obovate, flat, coriaceous, shining, compound. The only species in cultivation is the under-mentioned. It thrives in a compost of sandy loam or fibry peat, to which may be added a small quantity of leaf mould and charcoal. Propagation is effected by cuttings of stubby side shoots, inserted in sand, under a bell glass, in bottom heat.

P. Bojeriana (Bojer's).* *fl.*, corolla funnel-shaped, 1¼in. long, velvety without; lobes five, pink, very obtuse, broad; raceme terminal, sub-corymbosely trichotomous. July. Branches trigonal or sub-ancipital; true leaves absent, but rachis developed into a leaf-like expansion, which is constricted above the middle; lower portion obovate-cuneate, upper one elliptical. *h.* 3ft. 1844. SYN. *Arthrophyllum madagascariense.* (B. M. 4173.)

PHYLLAUREA. A synonym of *Codiæum*.

PHYLLIS (from *phyllon*, a leaf; the beauty of the species resides in its leaves). ORD. *Rubiaceæ*. A monotypic genus. The species is a glabrous or pilose, ornamental, greenhouse under-shrub, with terete branchlets. It succeeds in a strong, rich mould. Propagation may be effected by cuttings, which will root freely if inserted in sand, under a glass.

P. Nobla (Nobla). Bastard Hare's-ears. *fl.* white, hermaphrodite or polygamous, minute, disposed in terminal and axillary, many-flowered panicles; calyx tube ovoid, compressed, the limb two or five-toothed; corolla rotate-campanulate, with a four or five-parted valvate limb; floriferous pedicels erect; fruit-bearing peduncles nodding. June. *l.* opposite, or in whorls of three or four, ovate-lanceolate, acute; stipules connate, with the petiole in a sheath, entire. *h.* 3ft. Canary Islands and Madeira, 1699. *P. N. pauciflora* is a variety in which the flowers are less freely produced.

PHYLLOBIUS. A genus of small beetles, belonging to the great family of Weevils. The form, size,

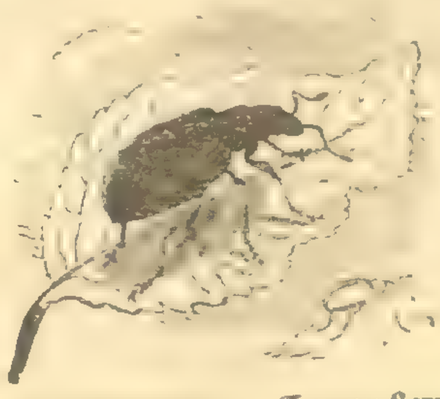


FIG. 131. PHYLLOBIUS OBLONGUS. (Lower figure is natural size; upper figure is enlarged.)

and general appearance are shown in Fig. 131. It will be observed that the beak is short and thick, and that the antennæ arise not far from the eyes, and are sharply elbowed. The body is often ornamented with scales of metallic lustre. The very numerous species are to be found on trees and bushes. One of the commonest is *Phyllobius oblongus* (see Fig. 131). This insect has

Phyllobius—*continued.*

the body black, covered with grey hairs, and occasionally shows a brown or red tinge on the wing-cases. The legs and antennæ are reddish or brownish-yellow. In summer, it gnaws the buds and the young leaves of most fruit-trees, often doing considerable damage. Other species that, at times, are hurtful in the same way, are *P. Pyri* (which is much like the last, but bears narrow, green, blue, or coppery scales, and has rusty-red legs and antennæ) and *P. viridicollis* (smaller, with a black, shining body, covered on the sides of the thorax and the breast with green scales; and red legs and antennæ).

Remedy. The most effectual is to beat the trees in the early morning, especially in dull weather, over an inverted umbrella, and to kill the beetles so collected in boiling water. A box or tray, tarred inside, may be used instead of an umbrella.

PHYLLOCACTUS (from *phyllon*, a leaf, and *Cactus*; in reference to the leaf-like stems). SYN. *Phyllocereus.* Including *Disocactus.* ORD. *Cacteæ.* A genus comprising about thirteen species of stove, epiphytal, succulent shrubs, natives of tropical America, from Mexico to Peru. Flowers rose, white, or red, axillary from the base of the rounded sinuses of the flattened, leaf-like branches; calyx tube generally long, slender, smooth; lobes remotely scattered, coloured; petals numerous, very rarely few, spreading; stamens numerous; stigma many-rayed. Fruit baccate, angular, smooth, ribbed; seeds kidney-shaped; cotyledons connate, sub-foliar. The botanical characters

FIG. 132. LONGITUDINAL SECTION OF FLOWER OF PHYLLOCACTUS.

istics of a flower of *Phyllocatcus* are shown in Fig. 132, where *a* represents the calyx tube; *b*, calyx lobes; *c*, petaloid calyx lobe; *d*, petals; *e*, style; *f*, ovary.

The species of *Phyllocactus* are of easy culture; they prefer a rather dry stove or warm greenhouse temperature, but will succeed in a frame, or even a window, after being once established. The most suitable soil is a light, porous loam, with some leaf mould and brick rubble intermixed. Drainage to the extent of one-fourth should be given, and rather small pots used in proportion to the size of plant. When plants have attained a good size, and their pots are filled with roots, an annual top-dressing of soil and cow-manure should be given, and during the growing season a little liquid

Phyllocactus—*continued.*

manure may also be applied. Watering must be rather carefully conducted, especially in winter: the roots soon die if kept too wet, or in too great a bulk of soil. Phyllocacti do not require any shade from sunshine, and they may be placed under a sunny south wall outside from about the end of June until the end of August; this greatly assists the ripening. They should be kept rather dry in winter. Cuttings of the mature shoots, about 6in. in length, taken before growth has commenced, in spring, and inserted singly in well-drained 3in. or 4in. pots, will root in a short time, if placed in a temperature of about 60deg. They should not be covered with a glass or watered, beyond the slightest syringing, to prevent the soil becoming very dry. Seeds ripen freely on healthy plants; they should be sown in spring, and placed in about the same temperature as cuttings. When the seedlings appear, a light position must be afforded them until they are large enough to pot off singly.

FIG. 133. BRANCH OF PHYLLOCACTUS ACKERMANNI.

P. Ackermanni (Ackermann's).* *fl.* with rich crimson, shining petals, the outer ones lighter in colour, from 6in. to 8in. in diameter, freely produced in the depressions of the stems. Summer. Stems flat, deeply crenated or notched, seldom with any spines in the notches except when young. Mexico, 1829. One of the handsomest species grown; from it a number of beautiful varieties have been raised. See Fig. 133. (B. M. 3598; B. R. 1331, under name of *Cactus* (*Epiphyllum*) *Ackermanni.*)

P. anguliger (angle-bearing).* *fl.* from 3in. to 5in. in diameter; petals white; sepals orange or yellowish, narrow, and spreading, open during the day, and emitting a powerful fragrance. October. Stems deeply angled, 2in. to 3in. in diameter, indented on the margin somewhat like a large saw with the teeth turned upwards, forming blunt, triangular lobes. Mexico. A very distinct species. See Fig. 134. (B. M. 5100; L. & P. F. G. 34.)

P. biformis (two-formed). *fl.* somewhat ephemeral, terminal at the points of the branches; petals narrow, 2in. to 3in. long, partially combined into a kind of tube of a pale rosy-pink colour. Branches narrow, flattened and leaf-like, reddish on the margins. Plant branching freely, forming a rather graceful, fleshy shrub. *h.* 3ft. Honduras, 1839. Not a very showy species. See Fig. 135. (B. M. 6156.) SYN. *Disocactus biformis* (B. R. 1845, 9).

P. crenatus (crenated).* *fl.* creamy-white in the centre; outer petals narrow and more orange-coloured, very fragrant, and from 6in. to 8in. in diameter. Stems flat, slightly crenated. Honduras, 1839. A handsome species, from which a great number of lovely hybrids have been raised. (B. R. 1844, 31, under name of *Cereus crenatus.*) The variety known as *coccineus* has large, scarlet flowers, which open widely. Mr. C. M. Hovey, Boston, U.S., has produced a race of hybrids between *Phyllocactus crenatus* and

Phyllocactus—*continued.*

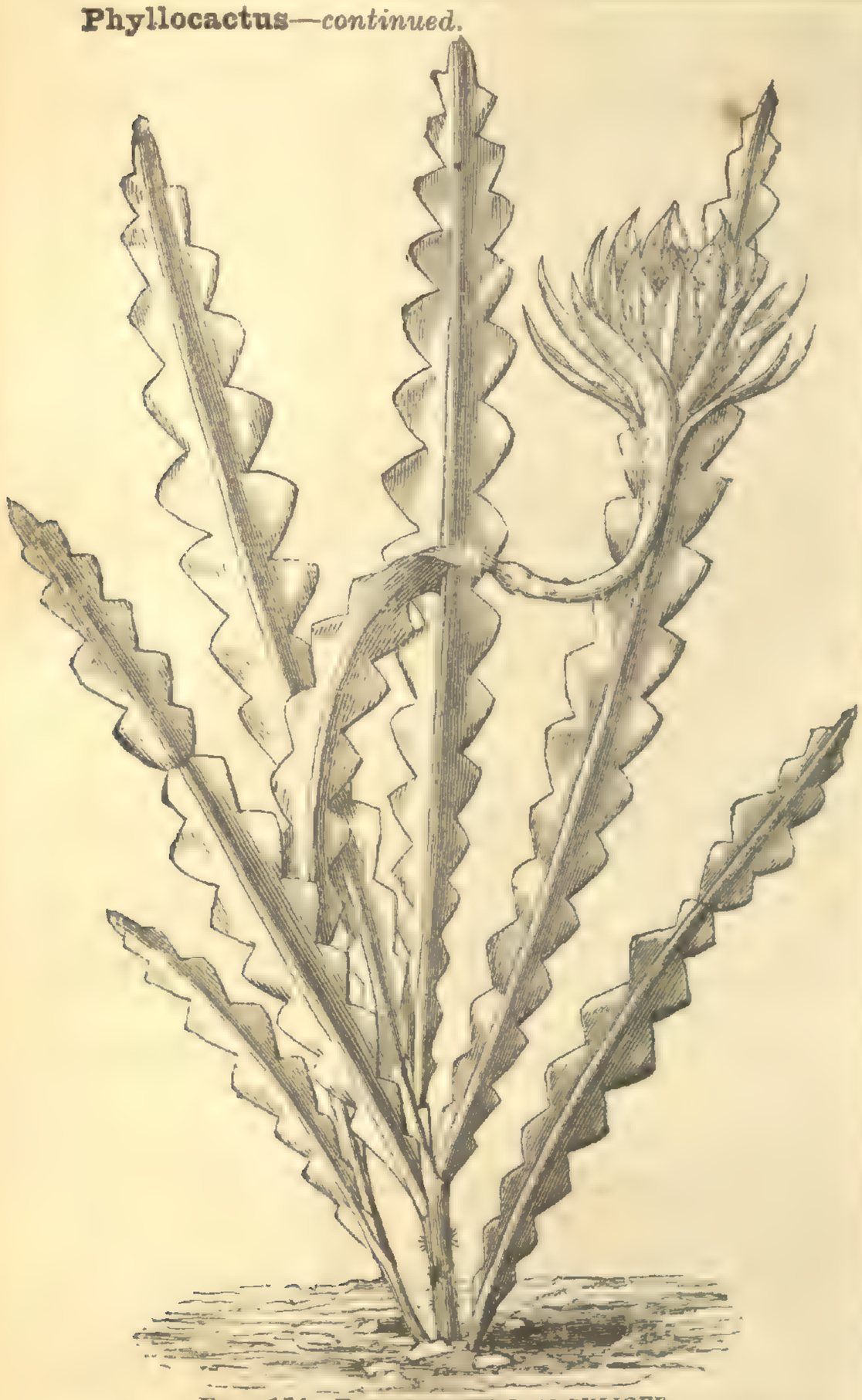


FIG. 134. PHYLLOCACTUS ANGULIGER.

what he terms *Epiphyllum splendidus*, but which is presumably some scarlet form of *Phyllocactus*. They were raised about the year 1870; their flowers, which often measure from 8in. to 12in. across, are very profusely produced. The best are as follows: ALICE WILSON, orange-scarlet; MAUVE QUEEN, purplish-pink; ORANGE GEM, shining orange; PINK QUEEN, mauve-pink; REFULGENCE, dark scarlet; and SUNSET, rich crimson.

P. Hookeri (Hooker's). *fl.* agreeably fragrant, produced on the margin of the stems; tube long, narrow; petals white, tapering, 2in. to 3in. long, and about ¼in. broad. July to September. Branches and stems flat, and deeply crenated, 2ft. to 3ft. high. South America. SYN. *Cactus Phyllanthus* (under which name it is figured in B. M. 2692).

P. latifrons (broad-stemmed).* *fl.* very large, 7in. to 8in. long, about 6in. in diameter; petals of a delicate creamy-white; sepals and tube of a reddish hue. Stems stout, flattened, 4in. to 6in. broad, deeply crenated, 8ft. to 10ft. high. Mexico. A very strong-growing species. SYNS. *Cereus latifrons* (B. M. 3813), *C. expetalus*.

P. phyllanthoides (Phyllanthus-like).* *fl.* 2in. to 3in. long, 3in. to 4in. across at the mouth; petals ovate or lanceolate, and coloured rose and white, in irregular streaks. June. Stem flat, the margin crenated, and the centre reddish. *h.* 1ft. to 3ft. Mexico, 1810. A very beautiful species, and one of the most floriferous of the family. SYNS. *Cactus phyllanthoides* (B. M. 2092), *C. speciosus* (B. R. 304).

P. Phyllanthus (leaf-flowering). *fl.* white or creamy-white, 9in. to 12in. long, tubular, opening at night and exhaling a peculiar odour. June. Branches flattened and crenated. *h.* 1ft. to 3ft. South America, 1710. This species is inferior to many others of the genus. SYNS. *Cereus Phyllanthus*, *Epiphyllum Phyllanthus*.

The following forms are also worth growing: *P. caulorrhizus*, flowers handsome, 6in. in diameter, the petals white and the sepals pale green; ***P. Jenkinsoni***, a hybrid, or seedling, with large, handsome, brilliant crimson flowers; ***P. multiflorus***, flowers reddish-crimson, the surface of the petals having a peculiar, satin-like lustre.

PHYLLOCALYX (from *phyllos*, a leaf, and *kalyx*, calyx; alluding to the leafy calyx). ORD. *Myrtaceæ*. A genus comprising about twenty-four species of trees or shrubs, now included, by the authors of the "Genera Plantarum," under *Eugenia*. For culture of *P. edulis*, the only species which calls for description here, *see* **Myrtus.**

P. edulis (edible).* *fl.* axillary or lateral, solitary, with four oblong, leafy sepals, four perigynous petals, and numerous stamens. *fr.* yellow, oblong, about 1¼in. long, exhaling a strong, Pine-apple odour, and with a fine aromatic taste. *l.* distichous, oval or obovate-oblong, coriaceous, acuminate, shortly stalked. Brazil, 1884. A very interesting stove or greenhouse shrub (R. H. 1884, p. 348.)

PHYLLOCEREUS. A synonym of **Phyllocactus** (which *see*).

PHYLLOCLADUS (from *phyllon*, a leaf, and *klados*, a branch; alluding to the phyllodia, which are characteristic). Celery-leaved Pine-tree. SYN. *Thalamia*. ORD. *Coniferæ*. A small genus (four species) of greenhouse, evergreen shrubs or trees, with mostly sub-verticillate branches, natives of Tasmania, New Zealand, and Borneo. Flowers monœcious (or dioecious?), the males fasciculate at the apices of the branches, or solitary in the axils; staminal column sessile and small, or stipitate and rather long. True leaves minute, scale-like, alternate or scattered in a somewhat spinal manner, sometimes all abortive; phyllodes flabellate or pinnate, irregularly toothed or lobed. Cones fleshy, sometimes scarcely two lines in diameter, sometimes ovoid-globose, six lines long. The species, all of which have been

FIG. 135. PHYLLOCACTUS BIFORMIS.

Phyllocladus—*continued.*

introduced, succeed in a strong, loamy soil. They may be increased by means of cuttings of the ripened shoots, inserted in sand, under a bell glass, in spring. Bottom heat should be withheld until the cuttings commence swelling at the base.

FIG. 136. PHYLLOCLADUS GLAUCA, showing Habit, detached Branch, Phyllode, and Cluster of Fruits.

P. glauca (glaucous). Male catkins terminal, cylindric, anthers yellow; female catkins at the extremities of the phyllodes, sessile, narrow. Phyllodes fan-wedge-shaped, irregularly lobed, thick, coriaceous, rusty-green above, light shining green beneath. Seeds shining, about the size of a grain of Hemp. Tasmania, 1853. Shrub or small tree. See Fig. 136.

P. hypophylla (under-leaf). Phyllodes narrow, ovate-rhomboid or ovate-oblong, obliquely cuneate at base, scarcely attenuated into a petiole, crenate-lobed; lobes oblong, obtuse, crenulated, glaucous beneath. *h.* 10ft. to 30ft. Borneo. Tree.

P. rhomboidalis (rhomboidal).* Adventure Bay Pine. *l.*, real ones, or scales, very small and subulate or fine-pointed. Cladodia, or deciduous leaf-like branchlets, cuneate or rhomboidal, obtuse, obtusely toothed or lobed, ¾in. to 2in. long. New Zealand, 1825. A slender tree, 60ft. in height, or reduced to a shrub on the tops of mountains. SYN. *Podocarpus asplenifolius.*

P. trichomanoides (Trichomanes-like). Phyllodes distichous, with scales (rudimentary leaves) at their base, ¼in. to 1in. long, obliquely rhomboid, cuneate, or ovate, simple or pinnatifidly lobed; lobes truncate, erose. *cones* compressed, solitary on the margins of the phyllodes. *h.* 40ft. New Zealand, 1840. A slender tree.

PHYLLOCYCLUS. Included under *Canscora.*

PHYLLODES. A synonym of **Phrynium** (which *see*).

PHYLLODES. Flattened leaf-like petioles (without blades). A large number of the Australian Acacias bear no true leaves, but Phyllodes, which perform the same functions.

PHYLLODIUM. Included under **Desmodium** (which *see*).

PHYLLODOCE (name of a nymph mentioned by Virgil; with an allusion to the shining leaves in the derivation *phyllon*, a leaf, and *dokein*, to shine). ORD. *Ericaceæ.* A genus comprising only three species of small, hardy, Heath-like shrubs, inhabiting the mountainous and frigid regions of Europe, Asia, and North America. Flowers pink, blue, or purple, drooping, long-stalked, sub-umbellate at the tips of the branchlets; calyx five-parted, persistent; corolla ovoid, with five erect or recurved lobes; pedicels bracteate and bibracteolate at the base. Capsules erect. Leaves articulated with the branchlets, clustered, linear or linear-oblong, obtuse, entire or serrulated, coriaceous, persistent, shining, with revolute margins. The two species described below should be grown in peat, and propagated by layers.

P. cærulea (blue). A synonym of *P. taxifolia.*

P. empetriformis (Empetrum-like). *See* **Bryanthus empetrifolius.**

P. taxifolia (Yew-leaved). *fl.* lilac, few, drooping, in terminal, umbellate corymbs; corolla urceolate; pedicels ½in. to 1½in. long. May. *l.* shortly petioled, crowded, spreading, linear, obtuse, denticulate, ¼in. to ½in. long. Branches tubercled. *h.* 2ft. Europe (Britain), North America, &c. SYNS. *P. cærulea, Menziesia cærulea* (L. B. C. 164; Sy. En. B. 886).

PHYLLOMA. A synonym of **Lomatophyllum** (which *see*).

PHYLLOMANIA. An unusual production of leaves.

PHYLLOPERTHA HORTICOLA. *See* **May Bugs.**

PHYLLOSTACHYA. Included under **Habenaria** (which *see*).

PHYLLOSTACHYS (from *phyllon*, a leaf, and *stachys*, a spike; alluding to branchlets being furnished with leaves). ORD. *Gramineæ.* A genus comprising four or five species of arborescent, Chinese and Japanese grasses, with semi-terete stems, prominent lobes, and sub-verticillate, fascicled, leaf-bearing branchlets. Spikelets few (one to four) flowered, shortly sub-spicate, inclosed by one or two spathaceous bracts; spikes dense or loose, in loose, often numerous panicles. Leaves shortly petiolate, articulated with the sheaths, flat, tessellately veined. Whangee Canes appear to be the produce of *P. nigra*, the stems of which, "although slender, are nearly solid, and appear to be generally used for such purposes as require great strength and toughness. Chairs, pipe-stems, and walking-sticks are often seen in England made from the culms of this species" (T. L. S. xxvi. 35).

P. bambusoides (Bambusa-like). *fl.*, fertile spikelets three to five-flowered, ten to twelve lines long; spikes 1in. to 2in. long; inflorescence very variable, usually with the aspect of a panicle, 2ft. long. *l.* oblong-lanceolate, rounded or attenuated at base, petiolate, very acute at apex, usually 3in. to 4in. long, and ½in. to ¾in. broad. Culms reed-like, 10ft. to 12ft. high, unarmed, semi-terete, yellow, very smooth above, the nodes prominent, highly glabrous. Japan.

P. nigra (black).* *l.* linear-lanceolate, acuminate at apex, rounded or attenuated at base, shortly petiolate, usually 2in. to 3in. long, and four to six lines broad, one or both margins bristly ciliated, glabrous above, pale and almost pubescent beneath. Culm sometimes dwarf, 4ft. to 5ft. high, sometimes (in cultivation, *e.g.*, a fine specimen in the Crystal Palace, Sydenham, which was, unfortunately, destroyed by fire there) 25ft. high. China and Japan. SYN. *Bambusa nigra.*

PHYLLOSTICTA. *See* **Sphaeropsideæ.**

PHYLLOTA (from *phyllon*, a leaf, and *ous, otis*, an ear: referring to the shape of the leaves). ORD. *Legu-*

Phyllota—*continued.*

minosæ. A genus comprising six species of Australian, usually Heath-like, greenhouse shrubs. Flowers axillary or terminal; bracteoles often leaf-like, inserted under the calyx, and usually closely pressed to it; two upper calyx lobes broader, sometimes united into an upper lip; petals clawed; standard nearly orbicular, longer than the lower petals; wings oblong; keel much incurved. Pods ovate, somewhat turgid, two-valved. Leaves scattered, simple, linear, with revolute margins. For culture of *P. phylicoides*—the only species introduced—*see* **Pultenæa.**

P. aspera (rough). *A synonym of P. phylicoides.*

P. comosa (tufted). *A synonym of P. phylicoides.*

P. phylicoides (Phylica-like). *fl.* yellow, almost sessile in the upper axils, forming terminal, leafy heads or spikes, or becoming lateral by the elongation of the terminal shoot; calyx ¼in. long, glabrous or villous, the lobes about as long as the tube; standard nearly ½in. long, the lower petals rather shorter. May. *l.* numerous, narrow-linear, ¼in. to ¾in. long, obtuse or with recurved points, the margins revolute, tuberculate, scabrous, sometimes sprinkled with erect hairs. *h.* 2ft. 1824. SYNS. *P. aspera, P. comosa, P. squarrosa.*

P. squarrosa (squarrose). *A synonym of P. phylicoides.*

PHYLLOTÆNIUM. Included under **Xanthosoma** (which *see*).

PHYLLOTRETA. A genus of leaf-eating beetles, in which are included several species, of small size, but of great importance, because of the amount of harm certain of them do to Turnips. Most of the species are partial to some one species or genus of plants, several of them preferring *Cruciferæ*. They were formerly referred to the very large genus *Haltica*, or *Altica*, which has been divided, for convenience, into several genera on minor points of structure. The species included in the old genus *Haltica* have the thighs of the hind pair of legs much thickened, enabling the beetles to leap considerable distances; and this habit has gained for them their popular name of Turnip Fleas. Like most beetles of the group *Chrysomelidæ*, to which they belong, they have oval bodies, with well-developed, though not very long, legs and antennæ. The colour is usually shining black, blue-black, or green-black, with the thorax, head, and limbs, in some, red or brown-red. In a few, the elytra bear yellowish stripes. For injuries done by them, and remedies, *see* **Turnip Flea.**

PHYLLOXERA. *See* **Grape or Vine Louse.**

PHYLLUM. Greek for Leaf. Used in conjunction with numerals, *e.g.*, Diphyllous, two-leaved; Triphyllous, three-leaved, &c.

PHYMATANTHUS. Included under **Pelargonium** (which *see*).

PHYMATODES. Included under **Polypodium** (which *see*).

PHYMOSIA. A synonym of **Sphæralcea** (which *see*).

PHYSALIS (from *physa*, or *physalis*, a bladder; alluding to the inflated calyx). Ground or Winter Cherry. SYN. *Pentaphiltrum.* ORD. *Solanaceæ.* A genus comprising not more than thirty species of greenhouse or hardy, mostly annual or perennial herbs, clothed with simple or stellate hairs; the majority of the species are American, being most frequent in Mexico and North America, but a few are broadly dispersed over the warmer regions of the globe. Flowers violet, yellowish, or white, often purple at maturity, frequently small, solitary in the axils, pedicellate; calyx campanulate or pyramidal, five-fid, inflated during fructescence; corolla broadly campanulate or almost rotate; limb five-angled or shortly five-lobed. Berry globose, included in the inflated calyx. Leaves entire, sinuated, or rarely pinnatifid. Very few of the species are of any horticultural value. *P. Alkekengi* is ornamental, in autumn and winter,

Physalis—*continued.*

when its fruits are ripe, on account of the highly-coloured, inflated calyx. This becomes skeletonised in due course, if left on the plant. *P. peruviana edulis* is occasionally grown as a dessert fruit, some people liking its peculiar flavour. The species described below are all herbaceous perennials, and will thrive in any common garden soil. Propagation of the annual species may be effected by seeds, and of the perennials by seeds and by division.

FIG. 137. FRUIT OF PHYSALIS ALKEKENGI, with part of accrescent Calyx removed.

P. Alkekengi (Alkekengi).* Winter Cherry. *fl.* white, with yellow anthers; mature calyx blood colour; corolla *not* spotted. July. *fr.* scarlet, edible. *l.* deltoid-ovate, acuminate, repand, long-stalked, attenuated into the petioles, including which they are 3in. to 4in. long, and 1½in. to 2in. broad. Stem almost simple. Roots creeping. *h.* 1ft. Caucasus, China (naturalised in North America), 1548. Hardy. See Fig. 137. (S. F. G. 234.)

P. peruviana (Peruvian). Cape Gooseberry. *fl.* whitish, with violet anthers; mature calyx pale, ovate; corolla spotted. July. *fr.* purplish. *l.* cordate, acuminate, entire or sinuate-toothed, slightly tomentose. Stem erect, somewhat branched. *h.* 3ft. South America, 1772 (naturalised in many warm countries). Greenhouse. Plant densely villous-pubescent.

P. p. edulis (edible).* *fr.* yellow, edible. *l.* almost entire. (B. M. 1068, under name of *P. edulis.*)

P. p. violacea (violet-fruited).* *fl.* yellow, with a dark purple spot at the base of each lobe. *fr.* dark violet, large, globose. *l.* cordate, acute. *h.* 3ft. Mexico, 1883. This is probably an improved cultivated form, with larger fruits than the type. (R. H. 1882, p. 216, under name of *P. violacea.*)

PHYSAPTERIS. Included under **Cheilanthes** (which *see*).

PHYSEMATIUM. Included under **Woodsia** (which *see*).

PHYSIANTHUS (from *physa*, a bladder, and *anthos*, a flower; referring to the shape of the flowers). SYNS. *Pentaphragma, Schubertia.* ORD. *Asclepiadeæ.* A genus regarded, by the authors of the "Genera Plantarum," as synonymous with *Arauja.* It comprises about thirteen species of stove or greenhouse, climbing, canescent or hirsute shrubs or sub-shrubs, natives of tropical and sub-tropical America. Flowers dirty white or pink, large; calyx five-parted, the segments leafy; corolla hypocrateriform or almost infundibular, with a spreading or sub-campanulate, five-fid limb; corona adnate to the base of the corolla; cymes two or few-flowered, on a solitary, axillary peduncle. Leaves opposite. The species thrive in a compost of sandy loam and fibry peat, with good drainage. Propagated, in summer, by cuttings of firm, stubby side-shoots, inserted under glass, in a gentle heat; or by seeds, sown on a hotbed, during spring. *P. albens* succeeds in a greenhouse, and is well adapted for training up a pillar or rafter.

P. albens (whitish).* White Bladder Flower. *fl.* white, with a tinge of red, downy, with a campanulately-urceolate corolla; cymes sub-dichotomous. July. *l.* opposite, cordate, white and pruinose beneath, beset with fine, white, scattered hairs above. Brazil, 1830. Greenhouse climbing shrub. SYN. *Arauja albens.*

Physianthus—*continued.*

See Fig. 138. (B. M. 3201; B. R. 1759.) In favoured spots, this will succeed in the open air against a sheltered wall.

P. auricomus (golden-haired). A synonym of *P. graveolens.*

FIG. 138. PORTION OF FLOWERING STEM AND DETACHED FLOWER OF PHYSIANTHUS ALBENS.

P. graveolens (strong-scented). *fl.* white, in umbels of six or seven. July. *l.* cordate-obovate, obtuse, softly pubescent, shining above. *h.* 10ft. Brazil, 1835. Stove climbing sub-shrub. SYNS. *P. auricomus* (B. M. 3891), *Schubertia graveolens* (B. R. xxxii. 21).

P. megapotamicus (Rio Grande). *fl.* green, white, and purple; lobes of corona denticulated; corolla rotate-campanulate; stigma exserted; peduncles one-flowered. June. *l.* narrow-lanceolate-hastate, acuminate. *h.* 20ft. Uruguay, 1865. Greenhouse climbing sub-shrub. SYN. *Arauja angustifolia.* (B. M. 5481.)

PHYSIDIUM (from *physa*, a bladder, and *eidos*, resemblance; in allusion to the shape of the lower lip). SYNS. *Schelveria*, *Thylacantha*. ORD. *Scrophularineæ*. A small genus of stove herbs, or rarely sub-shrubs, natives of South America, now regarded, by Bentham and Hooker, as synonymous with **Angelonia** (which *see* for culture).

P. cornigerum (horn-bearing).* *fl.* rich purple, deeper towards the mouth, the upper segments sprinkled with velvety dots, the intermediate one of the lower lip furnished at base with a horn-like process; peduncles single-flowered, hairy. August. *l.*, lower ones opposite, lanceolate; the rest alternate but approximate, small and bract-like. *h.* 1ft. or more. Brazil, 1839. Annual. SYN. *Angelonia cornigera* (B. M. 3848).

P. Gardneri (Gardner's). *fl.* purple, white in the centre, dotted with red, handsome, in long, terminal, leafy, bracteate racemes; pedicels solitary in the bracts. May. *l.* opposite, lanceolate, sessile, acuminate, regularly serrated. Stem erect, about 3ft. high; branches, as well as the leaves and peduncles, glandular-pubescent. Pernambuco, 1838. Sub-shrub. SYN. *Angelonia Gardneri* (B. M. 3754).

PHYSINGA. Included under *Epidendrum.*

PHYSOCALYCIUM. A synonym of *Bryophyllum.*

PHYSOCHLAINA (from *physa*, a bladder, and *chlaina*, an outer garment; alluding to the inflated calyx). SYN. *Belenia*. ORD. *Solanaceæ*. A small genus (four species) of hardy, erect, glabrous, perennial herbs, natives of Central Asia. Flowers erect or scarcely drooping, disposed in a loose or dense, terminal corymb; calyx tubular-campanulate, five-fid, including the capsule; corolla funnel-shaped or somewhat campanulate, the limb of five broad, erecto-patent, imbricated lobes. Leaves membranous, entire or sinuated. The three species introduced are very

Physochlaina—*continued.*

desirable plants, producing their elegant flowers early in the season. They thrive in any ordinary soil, and may be readily increased by cuttings, or by seeds.

P. grandiflora (large-flowered). *fl.* greenish-yellow, with purple markings, drooping; corolla above 1in. long, between campanulate and funnel-shaped, with a spreading mouth; panicle terminal, leafy. March. *l.* alternate, petiolate, ovate, acute, penninerved, thrice as long as the petiole. Stem glandular-downy. *h.* 1½ft. Thibet. (B. M. 4600.)

P. orientalis (Eastern). *fl.* pale purplish-blue, pedicellate, fasciculately and capitately racemose; calyx much longer than the capsule; corolla widening gradually to the top. March to May. *l.* petiolate, deltoid-ovate, repand or entire, acute, downy. *h.* 1ft. to 1½ft. Iberia, 1821. (B. M. 2414 and S. B. F. G. 12, under name of *Hyoscyamus orientalis.*)

P. physaloides (Physalis-like).* *fl.* purplish-violet, pedicellate, terminal, capitately corymbose; calyx much larger than the capsule. March and April. *l.* petiolate, ovate, acute, somewhat repand or quite entire. *h.* 1ft. to 1½ft. Siberia, 1777. (B. M. 852 and S. B. F. G. 13, under name of *Hyoscyamus physaloides.*)

PHYSODEIRA. Included under **Episcia** (which *see*).

PHYSOLOBIUM. Included under *Kennedya.*

PHYSOSIPHON (from *physao*, to inflate, and *siphon*, a tube; referring to the slightly-inflated tube of the flowers). ORD. *Orchideæ*. A small genus (about four species) of stove epiphytal orchids, natives of tropical America, having the habit of *Pleurothallis.* Flowers small, in elongated racemes; sepals connate at base into an ovoid or urceolate tube, which is three-fid at the apex; petals fleshy, obovate-cuneate; lip small, articulated with the base of the column, in form like the other petals; pollen-masses two, ovoid. The species are of no great horticultural value. Those described below require culture similar to **Pleurothallis** (which *see*).

P. Loddigesii (Loddiges'). *fl.* yellow-green in the lower half, the rest deep red-orange, distantly disposed in an erect, racemose spike; scape very slender, filiform. July. *l.* solitary, one-nerved, oblong, sub-spathulate, obtuse. Rhizome slender, giving rise to several plants. Mexico. (B. M. 4869; L. B. C. 1601, under name of *Stelis tubata.*)

P. punctulatus (slightly-dotted). *fl.* greenish-yellow, purple-spotted, minute. *l.* cuneate-oblong. Bogota, 1870. An insignificant orchid. (Ref. B. 96.)

PHYSOSPERMUM (from *physa*, a bladder, and *sperma*, a seed; the teguments do not adhere to the seed in a young state). Bladder Seed. SYNS. *Danaa*, *Hænslera*. ORD. *Umbelliferæ*. A small genus (from two to five species have been quoted as distinct by various authors) of hardy, glabrous, perennial herbs, natives of Caucasian Europe and Asia. Flowers white, in compound, many-rayed umbels. Leaves ternato-pinnately decompound; segments cuneate, incised. The species have no horticultural value. *P. cornubiense* is a British plant.

PHYSOSPERMUM (of Cusson). A synonym of **Pleurospermum** (which *see*).

PHYSOSTEGIA (from *physa*, a bladder, and *stege*, a covering; alluding to the inflated calyx). False Dragon-head. ORD. *Labiatæ*. A genus consisting of

Physostegia—*continued.*

only three species of hardy, tall, erect, glabrous, or very slender and puberulous herbs, confined to North America. Flowers flesh-colour or purple, sessile; calyx tubular-campanulate, sub-equally five-toothed, becoming inflated at fructescence; corolla tube long, exserted; upper lip erect, entire or emarginate, the lower one spreading and trifid; whorls two-flowered, secund, densely or interruptedly spicate; spikes solitary, or often many, at the tips of the branches, sub-paniculate. For culture, *see* **Dracocephalum.**

P. imbricata (imbricated). A synonym of *P. virginiana speciosa.*

P. intermedia (intermediate). *fl.*, corolla five to six lines long, much dilated upwards; spikes filiform, commonly rather remotely flowered. Summer. *l.* linear-lanceolate, repand-denticulate. Stem slender, remotely leaved, 1ft. to 3ft. high.

P. parviflora (small-flowered). *fl.*, corolla rather narrow, ½in. long; spikes short, 1in. to 4in. long. Summer. *l.* lanceolate or ovate-lanceolate, denticulate. Stem rather slender, leafy, 1ft. to 2ft. high. 1825.

P. virginiana (Virginian).* *fl.* flesh-coloured or purple, about 1in. long, nearly sessile, approximate or distant; racemes terminal, simple, or paniculately branched. July to September. *l.* thickish, sessile, usually lanceolate, sometimes oblong-ovate or obovate, usually acute, irregularly and acutely serrated, narrowed at base, green on both surfaces. Stems erect, herbaceous. *h.* 1½ft. to 4ft. 1683. A variable species. SYNS. *Dracocephalum variegatum, D. virginianum* (B. M. 467).

P. v. denticulata (slightly-toothed). *fl.* in a more slender or loosely-flowered spike. *l.* crenulate-denticulate or obscurely serrated. A more slender and commonly low form. SYN. *Dracocephalum denticulatum* (B. M. 214).

P. v. obovata (obovate). *l.* oblong or obovate, often obtuse.

P. v. speciosa (showy).* *fl.* in dense, paniculate spikes. *l.* lanceolate, very acutely serrated. SYNS. *P. imbricata* (B. M. 3386), *Dracocephalum speciosum*, of Sweet (S. B. F. G. 93).

PHYSOSTELMA (from *physa*, a bladder, and *stelma*, a girdle; alluding to the shape of the corona scales). SYN. *Cystidianthus.* ORD. *Asclepiadeæ.* A genus comprising a couple of species of stove, climbing, glabrous shrubs, natives of the Malayan Archipelago, usually, but erroneously, referred to *Hoya.* Flowers rather large, in umbelliform cymes; calyx five-parted; corolla very broadly campanulate, sub-cyathiform; corona scales five, fleshy, radiate-patent. Leaves opposite, coriaceous, subfleshy, shining, veined. *P. Wallichii* is the only species in cultivation. For culture, *see* **Hoya.**

P. campanulatum (bell-shape-flowered). A synonym of *P. Wallichii.*

P. Wallichii (Dr. Wallich's).* *fl.* green, yellow; corolla campanulate, glabrous. May. *l.* coriaceous, almost veinless, oblong, acuminate, glabrous; when dry, reticulately veined. 1845. SYNS. *P. campanulatum, Hoya campanulata* (B. M. 4545, and B. R. 1847, 54).

PHYSOSTIGMA (from *physa*, a bladder, and *stigma*; the bearded style is terminated by a large, oblique hood covering the stigma). Ordeal Bean of Old Calabar. ORD. *Leguminosæ.* A monotypic genus. The species, *P. venenosum*, is a tall, climbing herb, shrubby at base, native of tropical Africa. Its seeds "are extremely poisonous, and are employed by the natives of Old Calabar as an ordeal; persons suspected of witchcraft, or other crime, being compelled to eat them until they vomit or die—the former being regarded as a proof of innocence, and the latter of guilt" (Lindley and Moore). This Bean is also remarkable for possessing a property causing contraction of the pupil of the eye.

P. venenosum (deadly). *fl.* purplish, resembling those of a Bean, axillary, pendulous, rather large, in a fascicled raceme; style bearded, terminated by a large, oblique hood, covering the blunt stigma. Pods dark brown, about 6in. long; seeds oblong or somewhat hemispherical, about 1in. long. *l.* pinnately trifoliolate, stipellate; leaflets ample. (B. M. Pl. 80.)

PHYSURUS (from *physa*, a bladder, and *oura*, a tail; in allusion to the shape of the spur). SYNS. *Erythrodes, Microchilus.* ORD. *Orchideæ.* A genus comprising about a score species of stove, terrestrial, leafy orchids, with root fibres usually fasciculate, in a creeping rhizome, inhabiting the warmer regions of Asia and America. Flowers small or mediocre, disposed in loose or dense, often elongated, almost sessile spikes; sepals and petals nearly equal, the lateral sepals placed beneath the lip, and the dorsal agglutinated to the petals; lip parallel with the column, concave, constricted below the apex, and extended downwards into a freely-swollen spur; column free or adnate to the bottom of the lip, straight and attenuated into an ultimately bifid rostellum, having the anther at the back, containing two sectile pollen-masses attached to an oblong or subulate gland. Leaves stalked, loosely-sheathed, often beautifully marked with veins. The species here described are those introduced to cultivation. For culture, *see* **Anœctochilus** (to which the present genus is closely allied).

Physurus—*continued.*

P. argenteus (silvery).* *l.* 2½in. long and 1½in. broad, light green, with well-defined, silvery markings. Stems 4in. in height. Brazil. An elegant, free-growing species, which does well in a warm house without a bell glass; a shady situation, and a plentiful supply of water to the roots, are important elements in its culture. SYN. *Anœctochilus argenteus.*

P. decorus (comely). *fl.* very indifferently small; sepals white, with green lines; lip small, with a yellowish-green spur. *l.* cuneate-oblong, acute, dark green, with whitish, longitudinal stripes. Probably Sumatra, 1873.

P. maculatus (spotted). *l.* 2½in. long, dark green, with two rows of white, oblong spots lying parallel with the midrib. *h.* 6in. Guayaquil, 1862. (B. M. 5305.)

P. nobilis (noble).* *l.* broadly ovate, dark green, marked with silvery veins. Brazil, 1865. A large and beautifully marked species. Very similar to *P. pictus*, but differing in its fringed lip. SYN. *Anœctochilus nobilis.*

P. Ortgiesii (Ortgies'). *l.* dark green, with a whitish midrib; spots of the same colour distributed over the entire surface. Columbia, 1873. Distinct, and very pretty. (F. & P. 1872, 243.)

P. pictus (spotted).* *l.* 3in. long, 1½in. broad, edged with dark green, and having a handsome, silver-frosted band down the centre, from which radiate a network of white veins. *h.* 6in. Brazil. A distinct and most desirable, free-growing species. (Ref. B. 73.) SYNS. *Anœctochilus argenteus pictus, A. pictus, Microchilus pictus.*

P. querceticolus (Oakwood-dwelling). *fl.* borne in loose spikes; lip three-toothed at apex. *l.* 2in. to 3in. long, ovate, acute, light green, blotched with silvery-grey on each side of the midrib, imparting an appearance to the intervening spaces of being silvered over. *h.* 3in. to 4in. or more. New Orleans. A distinct, free-growing species.

PHYTARRHIZA. Included under **Tillandsia** (which *see*).

PHYTELEPHAS (from *phyton*, a plant, and *elephas*, ivory; referring to the seed, which, under the name of Ivory Nut, is largely imported and used by turners in forming small, ivory-like toys, buttons, &c.). SYN. *Elephantusia.* ORD. *Palmæ.* A genus comprising three or more species of low, unarmed palms, with a robust and erect or prostrate and rooting caudex; they are natives of Peru and New Grenada. Plant dioecious; male flowers with petals 2in. to 3in. long; spadices borne on scaly peduncles, males pendulous, females erect; spathes two, complete, elongated, thick, coriaceous or woody. Fruit consisting of a collection of four to six drupes, forming large clusters, the drupes covered outside with hard, woody protuberances. Leaves terminal, elongated, pinnatisect; segments numerous, the upper ones opposite, the lower ones alternate or fascicled, linear-lanceolate, acuminate; margins recurved at base. A compost of two parts rich loam, and one each of peat and river sand, is most suitable. The plants enjoy a liberal supply of water, and perfect drainage is essential.

P. macrocarpa (large-fruited).* Ivory Nut Palm; Negro's Head. *fr.* a drupe containing from six to nine seeds—the Vegetable Ivory of commerce. *l.* 15ft. to 20ft. long, erect, beautifully arched, pinnate, rich dark green; pinnæ very long. Caudex or trunk creeping, rooting. *h.* about 6ft. New Grenada, 1846. (B. M. 4913, 4914.)

P. microcarpa (small-fruited). *l.* 20ft. to 24ft. long, lanceolate, with about 100 pinnæ, the inferior being alternate and the upper opposite, linear, the largest 3in. long, 2in. wide, three-nerved. Peru, &c. Plant stemless.

PHYTELEPHUSIEÆ. Included under *Palmæ.*

PHYTEUMA (an old Greek name, meaning simply "the plant," used by Dioscorides, for a kind of *Reseda*). Horned Rampion. SYN. *Rapunculus*. Including *Petromarula*. ORD. *Campanulaceæ*. To this well-known genus about fifty plants have been referred as species, but this number may be reduced. They are mostly hardy perennial herbs, natives of Europe, the Mediterranean region, and temperate Asia. Flowers often sessile, variously disposed; calyx tube adnate, hemispherical or oblong-obconical, with a five-parted limb; corolla five-parted almost to the base, the lobes linear and cohering a long time. Radical leaves long-stalked; cauline ones alternate, smaller. The species are very pretty plants for rockwork and borders; they thrive in any moderately good garden soil. Propagation is easily effected by seeds, or by divisions, in spring. The dwarf-growing mountain species, such as *P. comosum*, like a well-drained spot in the rockery. The following are the best known; they are all hardy perennial herbs.

P. betonicæfolium (Betony-leaved). *fl.* blue; spikes ovoid, almost bractless. June. *l.* glabrous or pilose, lower ones oblong, acuminated, simply serrulated; upper ones linear-lanceolate, nearly entire. Stems glabrous. *h.* 6in. to 12in. Pyrenees, &c., 1818.

P. campanuloides (Campanula-like). *fl.* deep violaceous-blue, disposed in a spike 2in. to 3in. long, one to three together, from the axils of the bracts. June to August. *l.*, lower ones petiolate, ovate, bluntish, crenated; middle ones broad, sessile, ovate, acute, crenated; upper ones lanceolate, serrated. *h.* 1ft. to 2ft. Caucasus. 1804. (B. M. 1015.)

FIG. 139. PHYTEUMA CHARMELII, showing Habit and detached Inflorescence and Flower.

P. Charmelii (Dr. Charmeil's). *fl.* blue, in spherical heads. May to August. *l.* of various forms; radical ones on long petioles, cordate-ovate, acute, coarsely serrate-toothed; lower cauline ones petiolate, lanceolate, irregularly serrate-toothed. *h.* 6in. to 12in. Apennines, &c., 1823. See Fig. 139.

P. comosum (tufted).* *fl.* on short peduncles, disposed in loose, umbel-formed fascicles; corolla purple or blue, inflated at the base, tube-formed. July. *l.* coarsely and acutely toothed; radical ones on long petioles, cordate-ovate-roundish; cauline ones on short petioles, ovate-lanceolate, acute. *h.* 3in. to 6in. Dalmatia, Carniola, South of Tyrol, &c., 1752. (B. M. 6478; J. F. A. app. 50.)

P. humile (dwarf).* *fl.* blue, in globose heads. July. *l.*, radical ones crowded, linear-lanceolate, narrow at the base, nearly entire; cauline ones few, linear, entire. *h.* 3in. Switzerland, &c., 1825. See Fig. 140.

P. limoniifolium (Limonium-leaved). *fl.* blue, sessile; spikes long, interrupted. June and July. *l.*, radical ones on long petioles, quite glabrous, lanceolate, a little toothed. Stems branched. *h.* 2ft. to 3ft. South Europe, &c., 1819. (B. M. 2145, under name of *P. stricta*; L. B. C. 667, under name of *P. virgata*; S. F. G. 2183.)

P. Michelii (Micheli's). *fl.* pale or deep blue; spikes ovate; bracts reflexed. July and August. *l.* of various forms; radical ones petiolate, ovate-cordate or ovate; cauline ones linear-lanceolate. Stems simple. *h.* 1ft. to 2ft. South Europe, 1819. (B. M. 2271; B. M. 2066, under name of *P. betonicæfolium*). SYN. *P. scorzonerifolium*.

Phyteuma—*continued.*

P. orbiculare (orbicular). *fl.* deep blue, in round heads. June to August. *l.*, radical ones petiolate, lanceolate, sub-cordate, crenated; cauline ones sessile, linear-lanceolate. *h.* 6in. to 18in. Europe, &c. (in pastures and by roadsides, on a chalky soil). (B. M. 1466; Sy. En. B. 864.)

P. pinnatum (pinnate). *fl.* blue or white, pedicellate, disposed in loose racemes. August. *l.*, first radical ones petiolate, ovate, acute; the later ones pinnate, with the petioles margined and lobed. *h.* 3ft. to 6ft. Crete, 1640. (S. B. F. G. ser. ii. 224.)

FIG. 140. PHYTEUMA HUMILE, showing Habit and detached Flower.

P. Scheuchzeri (Scheuchzer's). *fl.* deep blue, in spherical heads. May. *l.* petiolate, ovate-lanceolate, bluntly serrated; lower cauline ones linear-lanceolate, acutely serrulated; upper ones linear, nearly entire. *h.* 1ft. European Alps, 1813. (B. M. 1797.)

P. scorzonerifolium (Salsify-leaved). A synonym of *P. Michelii*.

P. Sieberi (Sieber's). *fl.* deep blue, in spherical heads. May. *l.*, radical ones petiolate, ovate-roundish, sub-cordate, crenated; lower cauline ones petiolate, lanceolate, coarsely toothed; upper ones stem-clasping. *h.* 3in. to 6in. Apennines, 1826.

P. spicatum (spiked). *fl.* white, cream-coloured, or blue; spikes cylindrical, elongated. July. *l.*, lower ones on long petioles, cordate, ovate-acute, bi-serrated; upper ones ovate-lanceolate. *h.* 1ft. to 3ft. Temperate parts of Europe (Britain), 1597. (B. M. 2347; Sy. En. B. 865.)

PHYTOCRENE (from *phyton*, a plant, and *krene*, a fountain; alluding to the quantity of sap which flows from the plants when cut). SYN. *Gynocephala*. ORD. *Olacineæ*. A genus comprising about five species of tall, stove, climbing or twining shrubs, abounding in limpid juice (which is drunk by the natives of Martaban), natives of tropical Asia. Flowers villous, small, the female heads solitary, larger than the paniculate male heads. Leaves alternate, entire or palmately lobed. The wood of these plants is soft and porous, and of peculiar structure. *P. gigantea*, the East Indian Fountain-tree, is the only species introduced. It is a stove climber, of no particular horticultural value.

PHYTOCRENEÆ. A tribe of *Olacineæ*.

PHYTOLACCA (from *phyton*, a plant, and *lac*, lake; referring to the crimson juice of the fruit). ORD. *Phytolaccaceæ*. A genus comprising about half-a-score species of stove, greenhouse, or hardy shrubs, herbs, or rarely trees, erect or climbing, natives of tropical and subtropical America, Africa, and Asia. Flowers mediocre, racemose or thyrsoid, opposite the leaves; perianth herbaceous or slightly coloured, four-parted, the segments remaining unchanged during fructescence, spreading or reflexed; stamens five to twenty-five, inserted at the base

Phytolacca—*continued.*

of the perianth. Fruit sometimes deep purple, depresso-globose, succulent; carpels five to twelve, free or connate. Leaves alternate, sessile or stalked, acute or obtuse, entire; stipules none. The under-mentioned species—those best known to cultivation—are very desirable, hardy, herbaceous plants. They are of easy culture in almost any kind of soil. Propagated by seeds, or by divisions.

FIG. 141. RACEMOSE INFLORESCENCE OF PHYTOLACCA DECANDRA.

P. decandra (ten-stamened).* Virginian Poke Weed; Pigeon-berry; Red-ink Plant. *fl.* white, in long, extra-axillary racemes, succeeded, in the autumn, by dark purple berries, filled with crimson juice. *l.* ovate, petiolate, nearly 6in. long and about 2½in. broad, changing to purple in the autumn. Stem often purple, erect, divided at top. Roots large, fleshy, poisonous. *h.* 3ft. to 10ft. 1768. A vigorous-growing plant, with a rather unpleasant odour. See Fig. 141. (B. M. 931.)

P. icosandra (twenty-stamened). *fl.* pinkish-white, in a very loose raceme, 6in. to 12in. long, attenuated at the apex. *fr.* depressed at apex, watery. *l.* elliptic or oblong-ovate, acuminate, mucronate, rather thick, 4in. to 9in. long (including the slender petiole of 1in. to 3in.), and 1½in. to 4in. broad, but sometimes as much as 1ft. long. Stem 2ft. to 3ft. or more high. Mexico, &c. (B. M. 2633, 4967.) SYN. *P. mexicana* (S. B. F. G. 571).

P. mexicana (Mexican). A synonym of *P. icosandra*.

PHYTOLACCACEÆ. A natural order of trees, shrubs, or herbs, with a woody base, usually glabrous; they are mostly tropical and sub-tropical, but a few are found in temperate regions. Flowers often greenish or white, hermaphrodite or unisexual, generally racemose, rarely axillary, very often bracteate and bibracteolate; perianth herbaceous or coriaceous, rarely membranous or coloured, four or five-parted, very rarely obconical and disk-formed, with the segments imbricated in æstivation, fruit-bearing ones persistent; petals (except in one species) wanting; stamens four or many, rarely perigynous, often inserted on a hypogynous disk; filaments filiform or subulate, free or connate at base, generally persistent; racemes terminal and axillary. Fruit of one

Phytolaccaceæ—*continued.*

or more carpels. Leaves alternate, entire; stipules none, or small, or reduced to tubercles. Several species of *Phytolacca* have economic properties, mostly acrid, vesicant, or drastic. The order, which was long confounded with *Chenopodiaceæ*, contains nineteen genera and about sixty species. Examples: *Petiveria*, *Phytolacca*, and *Rivina*.

PHYTOMYZA. A genus of small, two-winged flies, the larvæ of which mine or burrow between the surfaces of the leaves of many plants, both wild and cultivated. Among the latter may be mentioned Turnips, Wallflowers, and Peas; in fact, most low garden plants, and various shrubs and trees, are liable to attack. The species of this genus are numerous, but all are of small size, about ⅛in. in spread of wing, and ⅛in. long. They are not unlike very small house-flies in form, and are usually dark, slaty-black, or ash-coloured, with the head and the legs often paler. The maggots are whitish; they tunnel out a winding gallery, which may not be visible on the upper surface of the leaf. When full-fed, they change, in the leaf, into chestnut, barrel-shaped pupæ, deeply ringed, and showing no external sign of the insect's form. The flies emerge in May and June. One of the most destructive and widespread species is *P. nigricornis*, the larvæ of which live in many different plants. *See also* **Holly-leaf Fly.** Fortunately, the mines, unless very numerous, do no great harm to the plants in whose leaves they are formed; but the unsightly blotches on choice garden plants may render the destruction of the larvæ desirable. This can be accomplished by crushing the mine, and the contained larva or pupa, between the finger and thumb; or the leaves may be picked off, and burned. Owing to the mode of life, external applications are of no avail in reaching the larvæ.

PHYTON. A plant. "A rudimentary plant, out of numbers of which perfect plants are made up" (Gaudichaud).

PHYTOPHTHORA (from the Greek *phyton*, plant, and *phthora*, destruction). A small group of parasitic Fungi, very closely allied to *Peronospora* in all important points of structure (*see* **Peronospora**), except that the stems bearing conidia (conidiophores) do not, as in that genus, produce only a single conidium on the tip of each branchlet. Instead of this, after a conidium is formed at the tip, the branch grows on from just below it, and produces a new conidium (see Fig. 142); and this process may be repeated several times. The reproduction by zoospores formed in the conidia, and also by oospores, or "resting spores," is much like that of *Peronospora nivea*. Few species are known, but of these one is the dreaded Potato-disease Fungus (*P. infestans*), too often seen wherever Potatoes are cultivated. Another is *P. Fagi* (also called *P. omnivora*), the cause of very widespread and serious disease in Beech seedlings, in many parts of Europe. It also grows well in seedlings of most of the commonly-cultivated coniferous trees, in the commoner Maples, and in many low-growing plants, *e.g.*, *Sempervivum*, *Clarkia*, &c. This latter Fungus has not yet caused damage in Britain; but, from its wide distribution, and its hurtfulness abroad, there is reason to dread its ravages should it appear in these islands. A short notice of it will, therefore, not be out of place here. It is injurious to trees only in the seedling stage, but, when it breaks out in a bed of seedlings of the kinds named above, the disease makes very rapid progress around the centres of infection. This progress is more rapid in warm, damp weather, and in shady situations, and, most of all, in beds crowded with young plants.

In the Beech, in which the disease has been most fully studied, the seedlings become black, and perish almost before germination; or they form the seed leaves and

Phytophthora—*continued.*

the first true leaves before the disease forms spots on the stems and on the various leaves. In damp weather, the diseased parts soon rot; in dry weather, they become dry and brown. All the diseased parts are penetrated by

FIG. 142. PHYTOPHTHORA INFESTANS—*a*, Entire Conidiophore, and base of a second, coming through a stoma of the leaf; on the branches are several Conidia (the thicker parts show the successive tips on which Conidia are formed in the way characteristic of the genus *Phytophthora*); *b*, Conidium, with five Zoospores inside it; *c*, Free Zoospore, with two Cilia; *d*, Zoospore, after settling down; *e*, Zoospore, emitting Mycelium. *a* is magnified about 80 times; the remainder about 400 times.

the threads of the Fungus; and numerous conidiophores, each producing two, or less often three, egg-shaped conidia, are pushed out through the skin of the stem or leaf. The conidia, if they fall into dewdrops, emit one or more mycelium threads, or they produce a number of "swarm-spores" (zoospores) in their interior, and these readily emit mycelium threads, which push in through the surface cells of the host-plants, and give rise to the disease anew. The damage thus spreads very rapidly. The Fungus is propagated in the following spring by means of the resting spores. These are produced as in *Peronospora*, and are formed in the diseased tissues. When the latter decay, the spores are scattered in the soil, there to remain till the warmth of the following spring promotes their germination. If a suitable host is at hand, the Fungus bores into it, and runs the same course as before. It has been found, experimentally, that resting spores can retain their capacity for germinating even for four years. Seed-beds of forest-trees of the species liable to injury should be established in places free from shade, and airy, to allow of free evaporation of superfluous moisture. All dead or dying plants should be at once picked out and burned. The seedlings must not be crowded. Ground where a diseased seed-bed has stood must not be used for making a new bed for some time, lest disease should break out afresh from germinating resting spores left in the soil, thus perpetuating the evil.

The Potato-disease Fungus (*P. infestans*) is one of the most hurtful of all Fungi, because of the damage it inflicts on the Potato crop; in some years, a half, or more, of the yield is destroyed. In the year 1845, the disease produced by this Fungus first came prominently into notice, since, in that year, it spread over the West of Europe, including Britain and Ireland, and over the Northern United States of America. In the latter half

Phytophthora—*continued.*

of August, the crop in our own country was blighted, causing heavy losses to farmers; while severe and fatal famine and disease followed in Ireland. In years previous to 1845, the disease of Potatoes had been observed occasionally in various places; but, since 1845, it has never been wholly absent from any country where it has once appeared, though it is much more destructive in some years than in others. The Fungus attacks several plants belonging to the same order as the Potato (*Solanaceæ*), such as the Bitter-sweet (*Solanum Dulcamara*), *Schizanthus*, and the Tomato (*Lycopersicum esculentum*). The damage done by it to the latter plant is sometimes considerable. Occasionally, it grows on plants of the order *Scrophularineæ*. The appearance of the diseased Potato-plants is too well known to require a long description. On the leaves

FIG. 143. POTATO-LEAF ATTACKED BY PHYTOPHTHORA INFESTANS, in the dark spots, *k*, *k*, *k*.

brown spots appear (see Fig. 143), rapidly extending, and becoming rotten towards the centre. The lower surface of the spot bears a thin, whitish coating, seen most distinctly on a watery-looking, discoloured border round the spot. This whitish coat consists of numerous conidiophores, emerging from the stomata in small groups. Each has a few branches, with conidia near the tips (see Fig. 142). The tissues of the leaf are full of the mycelium of the Fungus, pushed between, and lying in contact with, the cells of the leaf, and causing them to rot. Zoospores are formed in the conidia in water (*e.g.*, a dewdrop), as described under **Peronospora** (which *see*). They are set free by the conidium bursting, and each moves, by means of two fine hairs (see Fig. 142, *c*) in the water on the leaf. Each settles down after a little while, and emits (see Fig. 142, *e*) mycelium, which, in a short time, penetrates the leaf, and gives rise in it to a new diseased spot. Any movement of the diseased plants, by wind or otherwise, however slight, is sufficient to spread the conidia all round; and thus, from a single plant, a whole field may be infected in a very short time. But the whole plant becomes filled with the mycelium, alike in leaves, stems, and branches; and the tubers also become infected, both in this way, and by the entrance of mycelium tubes emitted by zoospores, washed down upon them if they lie near the surface of the soil. In whatever way the mycelium reaches the tuber, the latter becomes rotten, in patches or entirely; and, on careful

Phytophthora—*continued.*

examination, the starch grains are found to be dissolved and fissured. Where the tuber has not passed beyond the first stage of disease, it shows little sign of injury externally; and such tubers are often used for planting for next year's crop, with the frequent result of diseased plants growing from them. So far it may be said that all mycologists are agreed in regard to the development of this Fungus; but what remains to be stated here is still hotly discussed. Globular cells, three or four times the diameter of the mycelium, possessing a thick, warty outer coat, and a thin inner one, were observed in diseased potatoes, even as early as 1845. Mr. W. G. Smith has found such bodies very abundantly in old potatoes, and in diseased leaves kept in a vessel over water (*i.e.*, in moist air); and has observed, in regard to them, a process of development like that in *Peronospora nivea*, &c.; and he asserts that these brown, globular cells are the resting-spores of the Potato-disease Fungus. This is denied by Prof. De Bary, of Strasbourg, and by others. Mr. A. S. Wilson has brought forward a theory, with reasons in support of it, connecting with the Potato-disease Fungus numerous small, oval bodies (that are white by reflected, and dark by transmitted, light), which are very abundantly scattered through the tissues of Potato-leaves, &c. He and Mr. Smith believe that they have traced these small bodies into actual connection with the undoubted mycelium of *P. infestans*. The bodies, on analysis, are found to consist largely of particles of oxalate of lime, with a basis of protoplasm. Mr. Wilson regards them as a resting condition, analogous to the sclerotia of other Fungi, *e.g.*, that of *Peziza postuma*, in its uses to the *Phytophthora*. The true nature of the bodies has been hotly discussed in the "Gardeners' Chronicle" during the years 1883-85. Mr. Wilson regards Potatoes as almost all infected throughout their tissues by these resting masses of the Fungus, which, he considers, emit mycelium, and give rise to disease, under conditions favourable to the growth of the Fungus. Much has been written on remedies for the Potato disease; yet it can hardly be said that any methods have been discovered really efficient in securing the Potato crop against this scourge. Beyond doubt, the unnatural conditions induced by continuous cultivation and propagation from the tubers, have rendered the plants a more easy prey to the Fungus, and more liable to suffer severely from its attacks, than uncultivated plants would be; and this is seen if the effects on the Potato are contrasted with those on the Bitter-sweet, a plant also occasionally attacked by the Fungus. Prevention is best promoted by selecting, as seed tubers, varieties known to resist disease, since some are much hardier than others in this respect. The soil should be well drained, and there should be free circulation of air around the plants, to promote evaporation, since moisture, confined air, and warmth, promote the rapid growth of the Fungus. The seed tubers should be planted uncut, or the cut surfaces should be allowed to heal, or may be seared with a hot iron, or otherwise coated over, before being put into the soil. All tubers that show traces of disease, and all dead stalks, leaves, &c., should be burned, to prevent the propagation of the disease through them. Of recent years, Mr. Jensen, of Copenhagen, has strongly advocated "protective moulding," and his views have been stated and supported at some length by Mr. C. B. Plowright, in the "Gardeners' Chronicle." The system was also suggested by Dr. Lang, in 1858; but it has not been generally adopted. Mr. Jensen's method may be briefly summarised as follows: The ground should be thoroughly worked and quite friable, and the potatoes should be planted in rows about 30in. apart. The first moulding should be about 4in. high, and flat on top. The protective moulding should be done as soon as diseased spots appear on the plants, and, in any case, should not

Phytophthora—*continued.*

be deferred later than the time of Wheat-harvest: it is effected, on a small scale, in gardens, by the use of a hoe; on a large scale, in fields, by a specially-formed plough. The layer of earth should be, when it has settled down, not less than 4in. thick along each side of the row, above the tubers. At the same time, the tops should be bent over to one side of the row, and allowed to wither; and they may then be cut off and removed. The tubers may be lifted in about a week after the removal of the tops. This system proceeds on the belief that the tubers are infected by conidia and zoospores washed by showers from the leaves and through the soil on to the tubers, and not by mycelium through the stalk. Mr. Jensen also recommends disinfecting the seed tubers by storing them for four or five hours in a dry-air chamber, at a temperature of from 100deg. to 105deg. Fahr. Of course, other host-plants of the Fungus, whether wild or cultivated, ought not to be grown in the neighbourhood of Potatoes. Attempts have been made to substitute some other species of tuber-forming *Solanum* for *S. tuberosum*, but without great success. The most promising seem to be *S. Commersoni* and *S. Maglia*, the former of which appears to be uninjured by *P. infestans*.

PHYTOPTUS. *See* **Mites.**

PHYTOXIS (of Sprengel). A synonym of **Sphacele** (which *see*).

PIARANTHUS (from *piaros*, fat, and *anthos*, a flower; alluding to the shape of the blossoms). Ord. *Asclepiadeæ*. A genus comprising, perhaps, half-a-dozen species of greenhouse succulents, with low, deeply four-jointed stems, natives of South Africa. Flowers mediocre, often fasciculate; calyx small, five-parted; corolla campanulate, deeply five-cut, the lobes narrow, acuminate, valvate; corona lobes five, inflexed. The species have the general habit of **Stapelia** (which *see* for culture).

P. pullus (dark-flowered). *l.* three or four together; corolla dark purple, the segments lanceolate, silky above, replicate. August. Branches usually hexagonal, erect; angles a little sinuated, having strong, spreading teeth. *h.* 6in. 1774. (B. M. 1648.)

P. geminatus (twin). The correct name of plant described in this work as *Podanthes geminata*.

PICEA (from *pix*, pitch; the trees produce abundance of resin). Silver Fir. Syn. *Abies* (of Don). Including *Veitchia*. Ord. *Coniferæ*. A genus comprising about a dozen species of mostly hardy, evergreen trees, inhabiting the extra-tropical regions of the Northern hemisphere. Flowers monœcious. Leaves acicular, spirally scattered, with the midrib prominently quadrigonal or sub-terete, contracted into a very short, articulated, persistent petiole. Cones ovoid or oblong-cylindrical, erect or horizontally spreading; the bracts not falling away from the axis at maturity, as in *Abies*. Owing to a succession of blunders in works treating on Conifers, the generic names *Abies* and *Picea* are generally transposed. For culture, *see* **Abies.**

P. ajanensis (Ajona). *shoots* glabrous when young, yellowish-brown, marked with oblong smooth prominent cushions. *l.*, those on the side shoots in many rows, but twisted at the base so as to be all in the same horizontal plane; on the upper surface of the branch appressed, parallel in direction to the branch; all flattish, linear-oblong, rather obtuse, not spine-tipped; upper surface three-ribbed; underneath, one-ribbed. *cones* erect, 1in. to 2in. long, ¾in. broad, oblong, tapering to each end; scales shining-brown, oblong-ovate. *h.* 70ft. to 80ft. Japan, 1861. A beautiful Fir, resembling *P. excelsa*, but more elegant. Syn. *Abies Alcoquiana*, of gardens. (B. M. 6743; G. C. n. s., xviii. 183.)

P. alba (white).* White Spruce. *young shoots* very glaucous. *l.* less numerous, longer, and more pointed than in other species, somewhat glaucous, scattered around the branches, erect, quadrangular. *cones* oblong-cylindrical, light brown, small when ripe; scales loose and thin, round or bluntly pointed, with entire edges. *h.* 30ft. to 40ft. Canada, &c., 1700. (F. d. S. 2251.)

P. Alcoquiana (Alcock's).* *young shoots* covered with long, weak hairs. *l.*, those on the leader shoots appressed, on the lateral, given off on all sides; all rigid, more or less curved, linear-

Picea—*continued.*

oblong, four-sided, flattened at the top. *cones* deflexed, 2in. to 3in. in length, oblong, tapering to both ends; scales shining oblong-ovate. *h.* 90ft. to 120ft. Japan, 1861. A fine pyramidal tree. (G. C. n. s., xiii. 212.)

P. communis (common). A synonym of *P. excelsa*.

FIG. 144. PICEA EXCELSA.

P. Englemanni (Englemann's).* *l.*, in young plants, numerous, stout, rigid, acute, slightly recurved, deep green, more distinctly quadrangular than those of any other American species. *cones* 2in. to 2½in. long. *h.* 80ft. to 100ft. Rocky Mountains, 1864. A stately tree.

P. E. glauca (glaucous). A beautiful glaucous, silvery variety, very handsome and attractive.

FIG. 145. PICEA EXCELSA, showing (1) Fruiting Branch, (2) Scale with Seeds in position, and (3) Seed.

P. excelsa (tall).* Burgundy Pitch-tree; Norway Spruce Fir. *l.* scattered, quadrangular. *cones* cylindrical, terminal, pendent, 5in. to 7in. long, 1½in. to 2in. broad; scales naked, truncate at the summit, flat, 1in. to 1½in. long, and about ½in. broad. North of Europe, particularly Norway, 1548. A well-known, lofty tree. SYN. *P. communis*. See Figs. 144 and 145. The varieties are very numerous, the most important being the following:

P. e. attenuata (thin-leaved). A slender-growing form, with small and thinly-set leaves, which lie close to the branches. SYN. *P. e. tenuifolia*.

Picea—*continued.*

P. e. aurea (golden). A striking form, with long, curved, glaucous green leaves, which are tipped with gold.

P. e. Clanbrasiliana (Lord Clanbrasil's).* A very dwarf, dense, slow-growing shrub, rarely exceeding 4ft. high. A more erect-growing form of this variety is known as *stricta*.

P. e. elegans (elegant). *l.* more erect than in the type. *h.* 5ft. to 6ft. A compact, dwarf, and slow-growing bush, with short branches.

P. e. eremita (solitary). Very like *P. e. monstrosa*, but having shorter and thicker branches. Bark reddish. SYN. *P. miniata*.

P. e. Finedonensis (Finedon). *l.*, young ones on the upper side of the shoots, and the wood also, at first of a pale yellow, changing to a bronzy-brown, and, when fully matured, to a light green; those on the under side, and where shaded, more or less green from the first.

P. e. Gregoryi (Gregory's). A densely-branched, conical, slow-growing bush, of a bright green hue.

P. e. horizontalis (horizontal). A variety with a horizontal habit, and more curious than beautiful.

P. e. inverta (pendulous-branched). A very elegant weeping form, of free growth. *h.* 50ft. to 80ft.

P. e. monstrosa (monstrous). A curious variety, with elongated, straggling branches, very sparsely furnished with lateral growths.

P. e. nana (dwarf). A synonym of *P. e. pygmæa*.

P. e. pumila glauca (low-growing, glaucous). *l.* nearly erect on the branches. A very dwarf, spreading, slow-growing variety; very distinct and pretty.

P. e. pygmæa (pigmy). A diminutive variety, of a pyramidal shape. *h.* 1ft. SYN. *P. e. nana*.

P. e. pyramidalis (pyramidal). A dwarf, conical, slow-growing variety, suitable for rockwork.

P. e. tenuifolia (narrow-leaved). A synonym of *P. e. attenuata*.

P. e. variegata (variegated). A form with yellow, but somewhat inconstant, variegation.

P. Glehnii (Glehn's). *l.* crowded, in many rows, curved, linear, four-sided, sharply pointed. *cones* linear-oblong, 1in. to 2in. long, ½in. to nearly 1in. wide; scales leathery, slightly striated, wedge-shaped, upper free portion rounded, denticulate, longer than the broadly lanceolate, denticulate bracts. Japan, 1880. A dwarf, dense-growing tree. (J. L. S. xviii. 513.)

P. jezoensis (Yesso). *l.* linear, close set, and arranged spirally around the stem, sharp-pointed, with a prominent midrib on both sides. *cones* cylindrical, 2in. to 2½in. long, 1in. in diameter, obtuse both at base and apex, pendulous, terminal; scales undulated, irregularly toothed at the free edge. *h.* 100ft. to 120ft. Japan, 1879. A tall, fast-growing tree. (G. C. 1850, 311.)

P. Maximowiczii (Maximowicz's). *l.* rigid, acute, erect, ½in. long, dark green. A species that does not thrive in this climate, presenting, according to Messrs. Veitch, very miserable-looking specimens, and, therefore, not recommended. (G. C. n. s., xiii. 363.)

P. Menziesii (Menzies').* *l.* linear, mucronate, incurved, turned in every direction, resupinate from being twisted at the base, silvery beneath, 2in. long, rigid, acute. *cones* pendulous, cylindrical, generally 3in. long, and about 1in. broad; scales with a dry, shrivelled appearance, gnawed on the margin, about ⅔in. long, ⅜in. broad. *h.* 50ft. to 70ft. North California, 1831. A tall tree, with regularly whorled, somewhat stiff branches.

P. miniata (red-branched). A synonym of *P. excelsa eremita*.

P. Morinda (Morinda). A synonym of *P. Smithiana*.

P. nigra (black). Black Spruce. *l.* solitary, regularly disposed all round the branches, erect, ½in. long, somewhat quadrangular. *cones* cylindrical, 1½in. to nearly 2in. long, and nearly 1in. broad, blackish-purple; scales rounded, somewhat undulated, with crenulated or divided apices. *h.* 50ft. to 80ft. North America, 1700. The branches of the Black Spruce are drooping, and the tree is more useful for economic than ornamental purposes.

P. obovata (reversed-egg-coned). This species is said to resemble *P. excelsa*, but, owing to its very early growth, is unsuitable for cultivating in England. Siberia.

P. Omorika (Omorika). *l.* flattish, straight or curved, linear-oblong, obtuse, ½in. to ⅔in. long, shining green beneath; the upper side with a prominent midrib. *cones* Larch-like, 1¾in. long, ¾in. thick. Buds ovoid, clothed with ovate-lanceolate scales. Servia, 1884. A tall and distinct Fir. (G. C. n. s., xxi. 308-9.)

P. orientalis (Eastern).* *l.* solitary, acute, sub-quadrangular. *cones* sub-cylindrical, pointed at the apex, 3in. long; scales broader than long, slightly angular-ovate, rounded at the apex, sub-entire. Taurus and Caucasus, 1825. A somewhat dense-growing, lofty tree.

Picea—*continued.*

P. Schrenkiana (Schrenk's). A tall tree, considered to be a variety of *P. obovata*, found on the Altai Mountains, but not become acclimatised in Britain.

P. Smithiana (Smith's).* *l.* compressed, tetragonal, straight, awl-shaped, acutely pointed, 1in. to 1½in. long, scattered in insertion. *cones* ovate-oblong, 6in. long, 2½in. broad; scales obovate, roundish, coriaceous, rigid, smooth on the margin. *h.* 80ft. to 120ft. Himalayan Mountains, 1818. A well-known, very noble, and beautiful Spruce Fir, succeeding best when planted at great elevations, or on cold, late soils. SYN. *P. Morinda.* See Fig. 146.

P. Tsuga (Tsuga). *See* **Tsuga Sieboldii.**

FIG. 146. PICEA SMITHIANA.

PICEA (of Don). A synonym of *Abies.*

PICEUS. Black, changing to brownish-black.

PICKAXE. This is similar in shape to the common pick, but only one end is pointed, the other being wedge-shaped, and sharpened like an axe, to cut and remove roots, &c., when embedded in soil. The cutting part is in a line with the handle.

PICK, COMMON. A well-known garden implement, very useful for breaking up the hard surface of

Pick, Common—*continued.*

walks, land, &c. It is provided with an eye in the centre, through which the handle passes; both ends of the Pick are pointed alike, and curve slightly inwards, towards the person using it.

PICKEREL-WEED. *See* **Pontederia.**

PICKFORK. A combination draw hoe, or mattock, and a fork. It is useful for loosening soil, when the latter has become hardened by the sun, or from other causes, and also for breaking hard lumps. *See* **Hoes.**

PICOTEE. Picotees are only distinguished from Carnations by the markings of their flowers. The petals of a Carnation flower, other than a self, are either flaked or barred; while those of the Picotee (see Fig. 147) have a ground colour, and are edged with a second colour, which is used to separate the varieties into the divisions referred to below, according as the edging is lightly or heavily shown. The plants are propagated in the same way, and succeed under the same treatment, as Carnations; their flowers are superior, and the colours more clearly

Picotee—*continued.*

defined, when properly grown under glass, but, for ordinary purposes, the plants succeed admirably in the open air. Subjoined is a selection of Picotees from the several divisions. For details of culture, *see* **Carnation.**

FIG. 147. PICOTEE.

Heavy Purple-edged. ADMIRATION (Turner), JESSIE (Turner), LIZZIE TOMES (Dodwell), MRS. A. CHANCELLOR (Turner), MRS. SUMMERS (Simonite), MURIEL (Hewitt), NOVELTY (Matthews), PICCO (Jackson), REDBRAES, RIVAL PURPLE (Hooper), TINNIE (Dodwell), ZERLINA (Lord).

Heavy Red-edged. DR. EPPS, ENSIGN (Fellowes), J. B. BRYANT (Ingram), JOHN SMITH (Bower), LORD VALENTIA (Kirtland), LOTHAIR (Fellowes), MISS SMALL (Fellowes), MRS. BROWN (Payne), MRS. DODWELL (Turner), PICTURATA (Fellowes), PRINCESS OF WALES (Fellowes), ROBERT SCOTT (Flowdy).

Heavy Rose-edged. CONSTANCE HERON (Fellowes), EDITH DOMBRAIN (Turner), FANNY HELEN (Niven), LADY BOSTON (Fellowes), LOUISA (Addis), MISS HORNER (Lord), MRS. PAYNE (Fellowes), MRS. WEBB (Fellowes), ROYAL VISIT (Abercrombie).

Light Purple-edged. ALICE (Lord), AMY ROBSART (Dodwell), ANN LORD (Lord), BEAUTY OF CHELTENHAM (Abercrombie), CLARA PENSON (Wilmer), EVELYN (Hewitt), HER MAJESTY (Addis), MARY (Simonite), MINNIE (Lord), MRS. LANGTRY (Fellowes), NYMPH (Lord).

Light Red-edged. CLARA (Bower), GROSTEEN (Fletcher), MRS. BOWER (Bower), MRS. GORTON (Simonite), PRINCESS MARY (Fellowes), THOMAS WILLIAM (Flowdy), TOXOPHOLITE (Payne), VIOLET DOUGLAS (Simonite).

Light Rose-edged. DOROTHY (Fellowes), EMPRESS EUGÉNIE (Kirtland), ESTELLE (Fellowes), ETHEL (Fellowes), EVELYN (Fellowes), JEANETTE (Abercrombie), LADY CARINGTON (Abercrombie), LUCY (Addis), MISS GORTON (Dodwell).

Yellow-ground. FLAVIUS (Turner), MRS. COLMAN (Turner), PRINCE OF ORANGE (Perkins).

PICOTIA. A synonym of **Omphalodes** (which *see*).

PICRADENIA. A synonym of *Actinella.*

PICRIA. A synonym of **Coutoubea** (which *see*).

PICROPHLÆUM. A synonym of **Fagræa** (which *see*).

PICRORHIZA (from *pikros,* bitter, and *rhiza,* a root; in allusion to the bitterness of the root). ORD. *Scrophularineæ.* A monotypic genus, the species being a hardy, perennial, glabrous or pilose herb, the thick root of which is used in native Hindoo medicine. For culture, *see* **Wulfenia.**

P. Kurrooa (Kurroo, native name). *fl.* white or pale blue, disposed in clustered, terminal spikes, sessile in the axils of the bracts; calyx five-parted, the segments loosely imbricated;

Picrorhiza—*continued.*

corolla shorter than the calyx, with four broad, entire, erecto-patent lobes; peduncles scape-like, many-flowered, 4in. to 6in. high. August. Capsule nearly ½in. long, acuminate. *l.* sub-radical, oblong, crenate-serrate, 3in. to 4in. long, slightly wrinkled, entire at base, and gradually narrowed into a short petiole. Stem short. Himalayas, 1879.

PICTETIA (named in honour of A. Pictet, 1752-1825, a celebrated natural philosopher). ORD. *Leguminosæ.* A genus comprising half-a-dozen very glabrous, tropical American, ornamental, stove, evergreen shrubs. Flowers yellow in the axils, racemose or rarely solitary; two upper calyx lobes short, obtuse, the three lower ones acuminate; standard sub-orbiculate, keel obtuse. Pods oblong or broad-linear, stipitate, compressed, indehiscent. Leaves impari-pinnate; leaflets three to many, mucronate or pungent, entire, exstipellate; stipules often spinescent. The only two species in cultivation thrive in a compost of loam and peat. Propagation may be effected by cuttings, inserted in sand, under a glass, in heat.

P. aristata (awned). *fl.*, racemes loose, three to seven-flowered. June and July. *l.* with seven to ten pairs of obovate-orbicular, usually alternate leaflets, each leaflet ending in a long, straight, spine-like mucrone, having the lateral nerves prominent; stipules spinose, spreading. *h.* 5ft. to 10ft. St. Domingo, 1816. SYN. *Æschynomene aristata.*

P. squamata (scaly). *fl.* on distant, elongated, nearly opposite pedicels; racemes loose, three to seven-flowered. June and July. *l.*, leaflets seven to ten pairs, each ending in a long, spine-like mucrone; stipules spinose, erect. Branchlets with imbricated scales at their bases. *h.* 6ft. St. Thomas's Island, 1824. SYN. *Robinia squamata.*

PICTUS. Latin for **Painted** (which *see*).

PIDDINGTONIA. A synonym of **Pratia** (which *see*).

PIERCEA. A synonym of **Rivina** (which *see*).

PIERIS (a name applied to the Muses, from their supposed abode at Pieria, in Thessaly). ORD. *Ericaceæ.* A genus comprising about ten species of glabrous or pubescent, mostly hardy trees or shrubs, natives of the Himalayas, the Malayan Peninsula, Japan, and North-west America. Flowers white, rarely red, disposed in axillary or terminal, short or elongated racemes, shortly pedicellate, bracteate, and one or two bracteolate; calyx free, with five ovate, acute segments, persistent; corolla ovoid or cylindrical-urceolate, five-toothed, the lobes recurved; stamens ten, included. Leaves alternate, petiolate, persistent, entire or serrulate. The species best known to cultivation are described below. They require culture similar to that recommended for **Andromeda** (which *see*).

P. floribunda (bundle-flowered).* *fl.* pure white, produced in great abundance; racemes secund, axillary and terminal, forming panicles. April and May. *l.* ovate, oblong, acute, finely serrulated, adpressedly ciliated, glabrous, coriaceous. *h.* 2ft. to 6ft. United States, 1812. Shrub. SYNS. *Andromeda floribunda* (B. M. 1566 and B. R. 807) and *Leucothoë floribunda.*

P. formosa (beautiful).* *fl.* porcelain-white, disposed in terminal, branching clusters. *l.* coriaceous, green, somewhat bullate, lanceolate or oblanceolate, very finely serrated. 1881. A very beautiful evergreen shrub, hardy in the southernmost parts of England. (G. C. n. s., xv. 569.)

P. japonica (Japanese).* *fl.* white, urceolate, disposed in long, pendulous clusters. *l.* rather thick, dark green, lanceolate. Japan. Hardy shrub. (G. C. n. s., xvii. 797.) SYN. *Andromeda japonica* (B. H., 1871, 19; Gn., Nov., 1877).

P. mariana (Maryland). *fl.* white, large, nodding, in clusters from axillary, scaly buds; sepals leaf-like. May and June. *l.* deciduous, but rather coriaceous, oval or oblong, veiny, said to poison lambs and calves. *h.* 2ft. to 4ft. North America, 1736. Shrub. (B. M. 1759, under name of *Andromeda mariana ovalis.*)

P. nitida (shining). *fl.* white, red, or purple, odorous; corolla cylindrical-ovate, gibbous at base; clusters axillary, very numerous, six to twelve-flowered. March to May. *l.* ovate or oblong, entire, shining. Branches three-angled. *h.* 2ft. to 6ft. South United States, 1765. Evergreen shrub. (B. M. 1095, under name of *Andromeda coriacea.*)

P. ovalifolia (oval-leaved). *fl.* pale flesh-colour; corolla oblong, downy; pedicels unilateral, secund; racemes lateral, numerous, leafy, elongated, many-flowered. May. *l.* oval, acuminated,

Pieris—*continued.*

quite entire, 2in. to 4in. long, rounded at base, downy when young. Branches downy. *h.* 20ft. to 40ft. Nepaul, 1825. Half-hardy tree, poisonous to goats. *densiflora* is a dense-flowered variety, introduced from Assam in 1879.

P. phillyreæfolia (Phillyrea-leaved). *fl.* white; corolla ovoid; racemes solitary, axillary, loosely four to twelve-flowered. January to March. *l.* oblong or lanceolate-oblong, obtuse, glandular-serrate near the apex. Stem alternately leafy and bracted. *h.* 1ft. to 2ft. West Florida, 1842. Greenhouse or half-hardy shrub. (B. R. xxx. 36, under name of *Andromeda phillyreæfolia.*)

PIERIS. *See* **Cabbage Caterpillars.**

PIGAFETTA (name not explained by its author). ORD. *Palmæ.* A genus comprising three species of tall palms, with robust trunks prickly above, natives of the Malayan Archipelago and New Guinea. Flowers polygamo-monœcious, spirally disposed; spadices paniculately much branched, the peduncle and primary branches forming a tubular, incomplete spathe. Fruit globose or oblong, one-valved, one-seeded. Leaves terminal, pinnatisect; segments opposite and alternate, lanceolate, acuminate, with the margins recurved at base; petioles slightly terete, unarmed or prickly. *P. elata*, the only species in cultivation, is a very elegant palm. It requires culture similar to **Metroxylon** (which *see*).

P. elata (tall). *fl.*, spadices long, with pendulous branches. *fr.* globose, with a solitary, depressed, blackish seed. *l.* spreading and drooping, very similar to those of *Cocos*; petioles thick, with long bristles, which become spiny with age. Trunk of very hard wood, erect, simple, naked, annulate. Celebes. SYNS. *Hyospathe elata* (of gardens), *Metroxylon elatum.*

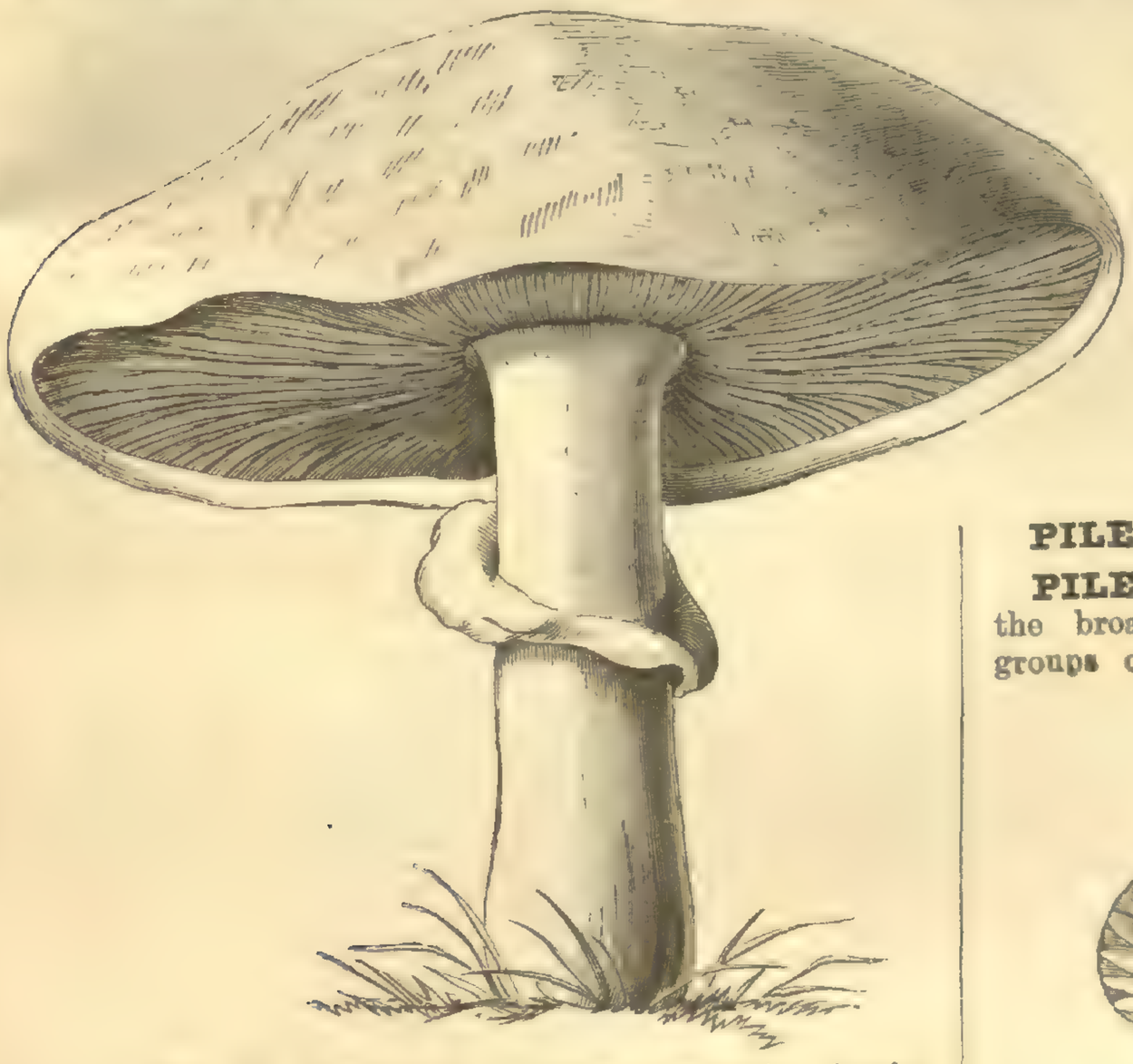


FIG. 148. MUSHROOM (*Agaricus campestris*), showing Regular Convex Pileus.

PIGEON BERRY. *See* **Phytolacca decandra.**

PIGEON PEA. *See* **Cajanus indicus.**

PIG-NUT. A common name of **Carya porcina** (which *see*).

PIG-ROOT. *See* **Sisyrinchium.**

PILEA (from *pilos*, a cap; alluding to the shape of one of the perianth segments). Stingless Nettle. SYNS. *Adike*, *Dubreuilia.* ORD. *Urticaceæ.* An extensive genus (about 160 species) of stove, annual or perennial herbs, rarely shrubby at base, sometimes creeping or diffuse, broadly scattered over the tropics, but not found in Australia. Flowers monœcious or dicœcious; male perianth of four, rarely two or three, and female of three, segments; cymes solitary in the axils, sometimes densely capituliform, sometimes loosely paniculate-branched, sessile or pedunculate. Leaves opposite, entire or toothed, three-nerved or nerveless. The species are mostly weeds. The one most commonly grown is *P. microphylla*, which, as well as the others described, is West Indian and Tropical American, and thrives in a compost of loam and leaf mould. Propagated by seeds, by cuttings, or by divisions.

Pilea—*continued.*

P. microphylla (small-leaved).* Artillery or Pistol Plant. *fl.*, cymes sub-sessile, contracted. Summer. *l.* obovate, quite entire, with a bluntish point, minute. Stem much-branched, herbaceous. *h.* 6in. 1793. SYN. *P. muscosa.*

P. muscosa (musky). A synonym of *P. microphylla.*

P. pubescens (downy). *fl.*, cymes corymbiform-paniculate, often 3in. in diameter, long-peduncled. *l.* large, ovate, pointed or bluntish at the top, coarsely serrate, entire at base, three-nerved, 2in. to 3in. long. Stem herbaceous, with branches 8in. to 12in. long. SYN. *Urtica involucrata* (B. M. 2481).

P. reticulata (netted). *fl.*, spikes axillary, simple, rarely branched, often leafy at top. *l.* opposite, rarely alternate, ovate or oblong-lanceolate, acuminate, crenate-serrate, 3in. to 6in. long. Stem 2ft. to 3ft. high, suffrutescent or herbaceous. 1793. SYN. *Urtica reticulata.* (B. M. 2567.)

PILEANTHUS (from *pilos*, a cap, and *anthos*, a flower; in allusion to the flower being inclosed in a one-leaved involucre). ORD. *Myrtaceæ.* A genus comprising two or three species of greenhouse, evergreen, Heath-like shrubs, glabrous except the flowers, and limited to West Australia. Flowers in the upper axils, forming leafy corymbs; calyx tube turbinate or campanulate; lobes ten, spreading, petal-like, entire; petals five, exceeding the calyx, spreading, shortly ciliated; bracteoles scarious, inclosing the bud. Leaves mostly opposite, linear-terete or triquetrous. The under-mentioned species requires culture similar to **Calythrix** (which *see*).

P. limacis (Limax-like). *fl.* white, on pedicels shorter than, or slightly exceeding, the leaves; calyx tube silky-pubescent. April. *l.* linear-clavate, semi-terete, very obtuse, nearly ¼in. long, smooth or glandular-tuberculate and slightly ciliated. *h.* 2ft. to 3ft. 1824.

PILEATE. Cap-like; having a pileus.

PILEUS (from *pileus*, a cap). The name given to the broad, expanded part in Mushrooms and allied groups of the larger Fungi. It is very frequently,

FIG. 149. MARASMIUS OREADES, showing Umbonate Pileus.

e.g., in the common Mushroom, shaped like an inverted saucer, or a shallow skull-cap (see Fig. 148), but shows a considerable diversity of shape in different

Pileus—*continued.*

species; *e.g.*, in *Marasmius oreades* (see Fig. 149) and *Hydnum repandum* (see Fig. 150). It is usually fixed by the middle of its lower surface, as in all the examples quoted, to the stop of a stalk; but in a good many Fungi that possess a Pileus, the stalk is fixed to one side (*e.g.*, in many species of *Polyporus*), and others want it altogether. The upper surface of the Pileus is usually covered with a skin or coat, which in many

FIG. 150. HYDNUM REPANDUM, showing Irregular Flattish Pileus.

species is slimy, but in some is scaly, in others hairy, &c. The Pileus bears generally, on its lower surface, the spore-producing surface, or hymenium — in some genera, in the form of gills; in others, like tubes or fleshy teeth (*see* **Mushrooms**). The Pileus and stalk together form the hymenophore.

PILEWORT. *See* **Ranunculus Ficaria.**

PILI. Hairs.

PILIFEROUS. Tipped with, or bearing, hairs.

PILLWORT. *See* **Pilularia.**

PILOCARPUS from *pilos*, a cap, and *karpos*, a fruit; referring to the shape of the berries). ORD. *Rutaceæ*. A genus comprising about five species of stove shrubs, natives of tropical America and the West Indies. Flowers green or purple, gland-dotted; calyx short, almost entire, or four or five-toothed; petals four or five, triangular; racemes or spikes simple, terminal or axillary. Leaves petiolate, opposite or alternate, or ternately whorled, one to three-foliolate or impari-pinnate, coriaceous or membranous, entire, pellucid-dotted. For culture, *see* **Chloroxylon.**

P. pennatifolius (feather-leaved). *fl.* purple, in crowded racemes, 18in. long; petals thick, lanceolate. *l.* alternate, impari-pinnate; leaflets two or three-jugate, elliptic or oblanceolate, the margins obsoletely revolute, pellucid-dotted. *h.* 6ft. Brazil. (B. M. Pl. 48; L. J. F. iii. 263.) This is one of the plants which furnishes the Jaborandi of commerce, an energetic diaphoretic and sialogogue.

PILOCEREUS (from *pilos*, wool, and *Cereus*; referring to the long hairs upon the spine-cushions).

Pilocereus—*continued.*

ORD. *Cacteæ*. A small genus of greenhouse succulents, now included, by Bentham and Hooker, under *Cereus*; the principal differences consist in the flower-bearing

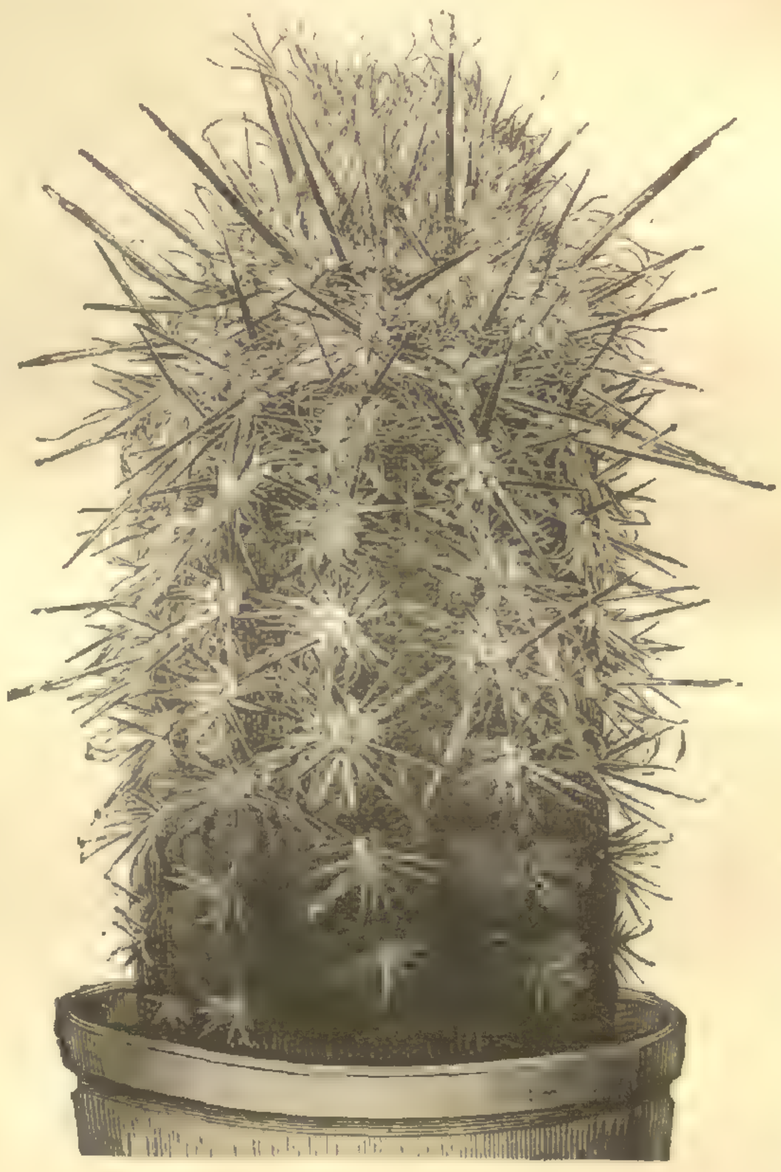


FIG. 151. PILOCEREUS BRUNNOWII.

portion of the plant being unlike the rest, usually forming a dense, woolly head at the summit of the stem, and having more numerous, longer and thinner, often hair-like spines, and the flowers themselves being smaller, and having fewer divisions, with the stamens attached to the whole surface of the tube. The species very rarely produce flowers in cultivation. For culture, *see* **Cactus.**

FIG. 152. PILOCEREUS DAUTWITZII.

Pilocereus—*continued.*

P. Brunnowii (Brunnow's). *fl.* unknown. Stem erect, cylindrical, many ribbed, bright green, thickly beset with shining spots; ribs nine to twelve, vertical, rounded, uneven when young, later on pretty smooth. Prickles about thirteen, central one much the longest, surrounded in the younger parts of the plant by long white hairs. Bolivia, 1870. See Fig. 151 (for which, as well as for Fig. 152, we are indebted to Herr Fr. Ad. Haage, jun., of Erfurt).

P. Curtisii (Curtis'). *fl.*, tube olive-green, 2in. long, ¾in. thick, expanding with many imbricating segments; within this is a series of pale rose-coloured, ovate petals; style deep rose-colour; stigma of seven or eight rays. Spring and summer. Plant 3ft. or more high, 1½in. to 2in. in diameter, erect, straight or somewhat flexuous, eight to ten-angled, beset with little tufts of wool; from these arise a spreading cluster of aculei, and from a tuft of this description springs the flower. Grenada. SYN. *Cereus Royeni.* (B. M. 3125.)

P. Dautwitzii (Dautwitz's).* Stem oblong or fusiform, bright green; traversed from base to apex by twenty-one shallow ribs, bearing closely-set tufts of small, white, spreading straight spines, and covered throughout, but more especially at the top, with a dense coating of long, white, cottony hair. Northern Peru, 1870. See Fig. 152.

P. fossulatus (grooved). Stem erect, club-shaped, with ten to twelve obtuse angles; sutures undulated, with a depression above each areole; spines pale brown, the central one very strong, 1in. long, the outer ones ten to twelve, depressed; hairs white, very strong, with a tuft on the apex. *h.* probably 20ft. A noble and very distinct, but scarce species. Peru (?). (G. C. 1873, 197.)

P. Houlletii (Houllet's).* *fl.* a kind of violet, with a suspicion of rose and yellow; segments very small, numerous, lanceolate, recurved; tube short, smooth, with a few pointed, reddish-green scales. Stem strong, grey-green; ribs seven or eight; prickles nine, straw-coloured, central one longest. The younger parts of the plant are covered with a white felt. See Fig. 153. (R. H. 1862, 427.)

P. senilis (aged).* Old Man Cactus. "A cylindrical-stemmed plant, 1ft. or more in height; but in Mexico, its native country, it attains a height of 20ft. to 25ft., with a diameter of 9in. or 10in., and its fluted character gives it somewhat the appearance of an architectural column. The stem is divided into thirty or forty narrow furrows, with corresponding ridges, which are furnished, at very short distances, with tufts of white spines, surrounded by numerous long, flexible, white hairs, resembling the grey hairs of an old man's head. . . . . When young, the stems are fleshy and succulent, but, as they get old, their tissue becomes filled with an extraordinary quantity of small, sand-like grains, composed of oxalate of lime, not less than from 60 to 80 per cent. having been found in individual stems" ("Treasury of Botany"). Mexico and Guatemala.

Pilocereus—*continued.*

PILOPHORA. A synonym of **Manicaria** (which *see*).

PILOSE. Covered with long, soft hairs; having the form of hairs.

PILOSELLA. Included under *Hieracium.*

PILOSIUSCULUS. Slightly hairy.

PILULARIA (from *pilula*, a little ball or pill; alluding to the shape of the heads containing the reproductive organs). Pillwort. ORD. *Marsileaceæ.* A small genus (three species) of obscure little aquatic plants, inhabiting temperate Europe, Western Asia, Australia, and North America. Rootstock creeping under water. Leaves solitary, erect, setaceous. "Capsule globose, two to four-celled, two to four-valved at the top; cells each with a longitudinal, parietal placenta, on which are inserted many pyriform, membranous sacs; sacs in the upper part of the cell full of microspores immersed in mucilage; those in the lower part contain each one macrospore. Microspores globular, full of antherozoids. Macrospores ovoid, with an outer coat of prismatic cells, pierced by a funnel-shaped opening, through which an inner, glassy coat finally protrudes. In germination, a prothallus is developed at the top of the protruded portion of the inner coat of the macrospore, which bursts and frees it. After expulsion, an archegonium is formed on the prothallus, and fertilisation takes place by the contents of the microspore" (Hooker). *P. globulifera* is found in damp meadows, among grass, especially where they have been overflowed with water during winter; it is widely distributed over England and Scotland, but

FIG. 153. UPPER PORTION OF PLANT OF PILOCEREUS HOULLETII, with Bud and Fruit (natural size).

Pilularia—*continued.*

very rare in Ireland. It is of more botanical than horticultural interest.

P. globulifera (globule-bearing). *rootstock* slender, often creeping to a considerable length, and rooting at every node. *l.* bright green, varying from 1in. to 4in. in length. Capsules pill-like, about ⅛in. in diameter, covered with short hairs. *h.* 3in. (F. D. ii. 223.)

PILUMNA. A synonym of **Trichopilia** (which *see*).

PIMELEA (from *pimele*, fat; alluding to the oily seeds). Rice Flower. SYNS. *Banksia* (of Forster), *Cookia*. ORD. *Thymelaceæ*. A large genus (seventy-six species have been described) of beautiful, greenhouse trees, shrubs, or rarely herbs, natives of Australia and New Zealand. Flowers hermaphrodite or rarely dicœcious, capitate-spicate or fascicled, terminal or axillary, very rarely solitary; perianth with a cylindrical tube, and four spreading or rarely erect lobes; stamens two, affixed to the throat. Leaves opposite or scattered, usually rather small. Most of the species which have been introduced are described below; except where otherwise stated, they are shrubs, and inhabitants of Australia.

Pimeleas are compact, free-growing, and very desirable greenhouse plants, especially as they flower when most of the other hard-wooded representatives are past. Their flower-heads are borne in the greatest profusion on the points of shoots that are made annually, those of one season flowering in that next following. The plants succeed in good fibrous peat and silver sand, or they may be grown as stronger specimens with loam instead of peat, if it is of good quality, and contains plenty of fibre. Cuttings, made of the young shoots, when they are about 2in. long, will root, if inserted, in spring, in a compost of one part peat to two of silver sand, and covered with a bell glass. They should be placed in an intermediate house, kept moist, and shaded from sunshine. When roots are formed, gradually admit air, and, in due course, pot off singly, and grow the plants on in a close, moist atmosphere until established, when a more airy situation will be best. Established flowering plants of Pimeleas may be treated somewhat like others of a hard-wooded description, except that they require rather more water and syringing. They are more than usually susceptible to the attacks of Red Spider, and, if this is allowed a footing, much injury will ensue. Pimelias may also be raised from imported seeds, when these are obtainable; young plants flower when they are very small, if allowed, but this is not advisable, as it tends to unduly weaken them. The habit assumed is such as to require but little training beyond stopping shoots on young plants that are inclined to take a lead. Each year, after flowering, all the heads should be cut over, and any necessary repotting attended to so soon as the new growth has commenced. The most beautiful species is *P. spectabilis*; others specially noteworthy are *P. ferruginea*, and *P. ligustrina hypericina*. The first-named and the last will grow into large specimens if desired; *P. ferruginea* is of a much more dwarf and compact habit.

P. arenaria (sand-loving). *fl.* white, villous or shaggy. May. *l.* close-set, but not imbricated, ¼in. to ½in. long, oblong or orbicular, pilose above, silky and shining beneath. Branches stout, densely villous. *h.* 8in. to 24in. New Zealand, 1827. A very beautiful little shrub. (B. M. 3270.)

P. crinita (hairy). A synonym of *P. imbricata piligera*.

P. decussata (decussate). A synonym of *P. ferruginea*.

P. diosmifolia (Diosma-leaved), of Loddiges. A synonym of *P. ferruginea*.

P. drupacea (drupe-bearing). Victorian Bird Cherry. *fl.* white, tinged with pink, small, not numerous; heads terminal on young shoots, but mostly appearing axillary and sessile from the extreme shortness of the flowering branches. May. *fr.* a drupe, red or black when ripe. *l.* all opposite, ovate to oblong-elliptic or oblong-linear, ¾in. to 2in. long, glabrous above, pale and often silky beneath. *h.* 2ft. to 6ft. 1817. (L. B. C. 540; S. F. A. 2.)

Pimelea—*continued.*

P. elegans (elegant). A synonym of *P. ligustrina hypericina*.

P. ferruginea (rusty).* *fl.* rose or red, in terminal, globular heads. May. *l.* opposite, usually crowded, sessile, ovate or oblong, obtuse, or scarcely mucronate, ¼in. to ½in. long. *h.* 1ft. to 2ft. 1824. SYNS. *P. decussata* (B. 136; L. B. C. 1283; S. F. A. 8), *P. diosmifolia* (L. B. C. 1708).

P. filamentosa (thread-like). A synonym of *P. linifolia*.

P. glauca (glaucous). *fl.* white; perianth nearly ½in. long; heads globular; involucral bracts usually four. June. *l.* opposite, from ovate to oblong-lanceolate or almost linear, sometimes all under ½in., sometimes ½in. to ¾in. or more long, flat or concave. *h.* 6in. to 18in. 1824. (L. B. C. 1611; T. L. S. x. 13.) SYNS. *P. humilis* (B. R. 1268), *P. intermedia* (B. 243; B. R. 1439).

P. Gnidia (Gnidia). *fl.* red, silky and villous. Early summer. *l.* crowded, shining above, petioled, ¼in. to ⅜in. long, oblong or oblong-lanceolate, acute or obtuse. *h.* 1ft. to 5ft. New Zealand.

P. graciliflora (slender-flowered). A form of *P. sylvestris*.

P. Hendersoni (Henderson's). A synonym of *P. rosea*.

P. hispida (hairy).* *fl.* blush-colour, in terminal, globular heads; perianth four to seven lines long. May. *l.* opposite, varying from ovate and under ½in. long to oblong or oblong-lanceolate and ⅔in. or more long, sessile or scarcely petiolate. *h.* 2ft. to 4ft. 1830. (B. M. 3459; B. R. 1578; L. B. C. 1966.)

P. humilis (dwarf). A synonym of *P. glauca*.

P. hypericina (Hypericum-like). A synonym of *P. ligustrina hypericina*.

P. imbricata piligera (imbricated, pili-bearing). *fl.* usually white, rather large, in globular heads, with eight or more involucral bracts. August. *l.* narrow, often ¼in. long, all or mostly clothed with long, loose, silky hairs. *h.* 6in. to 18in. 1837. SYNS. *P. crinita*, *P. nana* (B. M. 3833).

P. incana (hoary). A synonym of *P. nivea*.

P. intermedia (intermediate). A synonym of *P. glauca*.

P. lanata (woolly). A synonym of *P. sericea*.

P. ligustrina (Ligustrum-like), of Bot. Reg. A synonym of *P. ligustrina hypericina*.

P. ligustrina hypericina (Ligustrum-like, Hypericum-like var.).* *fl.* white, in globular heads; involucral bracts usually six to eight, silky-pubescent or hoary. May. *l.* opposite, ovate to oblong or elliptical, 1in. to 1½in. long, or on luxuriant shoots twice that size. *h.* 5ft. to 6ft. 1823. See Fig. 154. SYNS. *P. elegans* (I. H. viii. 295), *P. hypericina* (B. M. 3330), *P. ligustrina* (B. R. 1827).

P. linifolia (Flax-leaved). *fl.* white, in terminal, globular heads; involucral bracts four. May. *l.* opposite, on very short petioles, linear or oblong, passing into linear-spathulate or linear-lanceolate, from less than ½in. to about 1in. long. Branches usually slender and twiggy. *h.* 1ft. to 3ft. 1793. (B. M. 891; L. B. C. 1668.) SYNS. *P. filamentosa* (T. L. S. x. 14), *P. linoides*, *P. paludosa*.

P. linoides (Flax-like). A synonym of *P. linifolia*.

P. longiflora (long-flowered). *fl.* white, in globular heads, with five to eight involucral bracts. June. *l.* mostly alternate, linear, concave, from ½in. to above ½in. long, and usually erect. *h.* 1ft. to 4ft. 1831. (B. M. 3281.)

P. macrocephala (large-headed). A synonym of *P. suaveolens*.

P. nana (dwarf). A synonym of *P. imbricata piligera*.

P. Neypergiana (Neyperg's). A garden synonym of *P. Preissii*.

P. nivea (snowy). *fl.* white, in terminal, globular heads; involucral bracts four to six, rather larger than the cauline leaves June. *l.* opposite, ovate or orbicular, rarely broadly elliptic-oblong, less than ½in. long, rather thick, with recurved margins, and beneath, as well as the branches, white with tomentum. *h.* 4ft. 1833. SYN. *P. incana* (B. 147; B. R. 1838, 24).

P. paludosa (marsh-loving). A synonym of *P. linifolia*.

P. pauciflora (few-flowered). *fl.* white, few in the head. May. *l.* opposite, linear-lanceolate, acute or obtuse, mostly ¼in. to 1in. long, or, on some luxuriant shoots, narrow, and 1½in. long, flat or concave. *h.* 3ft. to 10ft. 1812. (L. B. C. 179.)

P. Preissii (Preiss'). *fl.* in globular heads, with four to six involucral bracts. April. *l.* opposite, linear-lanceolate or oblong-linear, slightly concave, ¼in. to above ½in. long. *h.* 1ft. to 2ft. 1846. SYN. *P. Neypergiana*, of gardens.

P. rosea (rose-coloured).* *fl.* pink or white, similar to those of *P. ferruginea*, but larger. June. *l.* opposite, linear or linear-oblong, often above ½in. long, with the recurved or revolute margins of the species just named. 1800. Allied to *P. ferruginea*, but taller and more slender. (B. M. 1458; L. B. C. 88.) SYN. *P. Hendersoni* (B. M. 3721).

P. sericea (silky). *fl.* in terminal heads; involucral bracts four to six, rather larger than the stem leaves. May. *l.* opposite, crowded, ovate or oblong, less than ½in. long, glabrous above. *h.* 1ft. to 2ft. 1834. This resembles *P. nivea*, but it may be "readily known by the dense indumentum of the branches and under side of the leaves consisting of silvery-silky hairs" (Bentham). SYN. *P. lanata* (B. 61).

Pimelea—*continued.*

P. spectabilis (remarkable).* *fl.* white, more or less tinged with pink, in usually large, globular heads, surrounded by four to six bracts, which are often coloured on the margins. May. *l.* mostly opposite, rather crowded, linear-oblong or lanceolate, flat or with slightly recurved margins, ¾in. to 1½in. long; the upper one often broader and shorter. *h.* 3ft. to 4ft. 1840. SYN. *P. Verschaffeltii.* (B. M. 3950.)

P. suaveolens (sweet-smelling).* *fl.* yellow when fresh, in globular heads; involucral bracts four to eight, usually ciliated. April. *l.* opposite, from ovate-lanceolate to oblong-linear, more or less concave, mostly ½in. to 1in. long. *h.* 1ft. to 3ft. 1848. SYN. *P. macrocephala* (B. M. 4543; L. J. F. 76).

FIG. 154. PIMELEA LIGUSTRINA HYPERICINA.

P. sylvestris (sylvan). *fl.* blush-colour, in globular heads; involucre of four to six bracts. June. *l.* opposite, oblong or lanceolate, mostly ½in. to ¾in. long, more or less concave. *h.* 2ft. to 3ft. 1830. (B. M. 3276; B. R. 1582; L. B. C. 1965.) *P. graciliflora* (B. M. 3288) is a form with broader leaves.

P. Verschaffeltii (Verschaffelt's). A synonym of *P. spectabilis.*

PIMENTA (from *Pimento*, the Spanish name). All-spice-tree. ORD. *Myrtaceæ.* A genus containing five species of very fragrant, stove trees, natives of tropical America, one being also frequently found in the East Indies. Flowers small, disposed in trichotomous, many-flowered cymes in the upper axils; calyx tube turbinate or campanulate, the limb of four or five spreading lobes or segments; petals four or five, spreading; stamens many-seriate. Fruit baccate, crowned with the calyx limb. Leaves ample, coriaceous, penniveined. The under-mentioned species require culture similar to **Myrtus** (which *see*).

P. acris (acrid). Baberry-tree; Black Cinnamon; Wild Clove. *fl.* white, with a slightly reddish tinge, five-cleft; peduncles axillary and terminal, trichotomous, corymbose, compressed, longer than the leaves. May to July. Berries as large as peas, having an aromatic smell and taste. *l.* elliptic, obtuse, convex, coriaceous, glabrous, reticulate-veined above, full of very fine, pellucid dots. *h.* 20ft. to 40ft. West Indies, 1759. The berries of this tree are useful for culinary purposes; the leaves also, having a sweet, aromatic smell, and on account of their astringency, are often used in sauces. SYN. *Myrcia acris* (B. M. 3153).

P. officinalis (officinal). Pimento-bush. *fl.* white, in compound, corymb-like cymes; calyx four-lobed, the tube as long as the ovary. May to July. Fruit globose. *l.* oblong or lanceolate-oblong, glabrous; veins obsolete above, primary distant and slightly prominent beneath. Branchlets compressed, sub-tetragonal, glabrate. *h.* 2ft. Jamaica, 1793. SYNS. *P. vulgaris, Eugenia Pimenta, Myrtus Pimenta* (B. M. 1236).

P. vulgaris (common). A synonym of *P. officinalis.*

PIMENTO-BUSH. *See* **Pimenta officinalis.**

PIMPERNEL. *See* **Anagallis.** The same name is occasionally used for *Poterium Sanguisorba* and *Prunella vulgaris.*

PIMPINELLA (said to be altered from *bipinnula*, twice pinnate; in allusion to the shape of the leaves). Burnet Saxifrage. Including *Sisarum.* ORD. *Umbelliferæ.* A genus comprising about seventy species of herbs, broadly dispersed over the Northern hemisphere and South Africa, a few being also found in extra-tropical South America. Flowers white or yellow, in compound umbels; involucral bracts none, or rarely one or two. Leaves pinnate, or ternately or pinnately decompound, rarely undivided and toothed. The species are of no horticultural value. *P. magna* and *P. Saxifraga* (Burnet Saxifrage) are British plants. *P. Anisum* is the Aniseed-plant of commerce.

PINACEÆ. Included under *Coniferæ.*

PINALIA. A synonym of *Eria.*

PINANGA (a local Malayan name). ORD. *Palmæ.* A genus comprising about twenty-five species of stove palms, usually low and slender-stemmed, natives of India and the Malayan Archipelago (one is found in the Deccan). Flowers in straight lines, in whorls, or in spirals composed of few turns, the male flowers having their sepals connected at the base, and scarcely overlapping, and containing a short, rudimentary pistil, or none at all; complete spathe solitary, twined or complicate-compressed, and two-winged; spadix usually small, sometimes very simple; peduncle short. Fruit usually yellow or blood-colour, ovoid or ellipsoid, the albumen of the seeds marked like a nutmeg. Leaves terminal, unequally cut or pinnatisect, or simply bifid at the apex, not thickened at margins, recurved at base; sheaths elongated. The species known to cultivation are described below. A compost of one part loam, two of peat, and a little sand, is most suitable; and an abundant supply of water is essential. Propagated by seeds.

Pinanga—*continued.*

P. coronata (crowned). *fl.*, spadix at first erect, eventually nodding. Branches thick and rather straight; flowering ones distichous, fruiting ones coarctate-fasciculate. *fr.* ellipsoid, crowning the disk-like stigma. *l.* pinnatisect, with a glabrous rachis; segments thick, elongated, linear, acuminate, the upper ones truncately incised at the apex. Trunk 15ft. to 20ft. high. Java, 1848. SYN. *Seaforthia coronata.*

P. globosa (globose). A synonym of *Calyptrocalyx spicatus.*

P. Kuhlii (Kuhl's). *fl.*, spadix nodding, with straight, thick, fastigiate branches. *fr.* distichous, ellipsoid, obtuse, smooth. *l.* pinnatisect, with the rachis slightly scaly; segments ten to thirteen on each side, falcate-lanceolate, very acuminate, the upper ones truncately cut at the apex, and sub-equally cuneate at the base. Trunk mediocre or rather tall. Java, 1873. SYNS. *Ptychosperma Kuhlii, Seaforthia Kuhlii.*

P. latisecta (broadly cut). *fl.*, spadix long-pedunculate, erecto-patent, trifid. *fr.* (immature), according to Martius, oblong-ellipsoid, slightly acute, smooth. *l.* pinnatisect, with the rachis lepidote-punctate; segments falcate-lanceolate, very much acuminate, sometimes bifid, the terminal one very broad, truncate at apex, and incised-toothed. *h.* 15ft. Sumatra. SYN. *Seaforthia latisecta.*

P. maculata (spotted). *l.* pinnate; pinnæ broad, sessile, pendent, bright green, blotched and spotted on the upper side with dark green. Stem slender, smooth. Philippines. A beautiful and rare species. (I. H. 1863, 361.)

P. malaiana (Malayan). *fl.*, male sepals lanceolate, acuminate, one-third as long as the broadly ovate, acuminate petals; females distichous, with a large, discoid stigma; spathe solitary; spadix refracted, three to five-branched. *l.* pinnate; pinnæ almost alternate, linear-lanceolate, acuminate, glaucous beneath. Trunk 8ft. to 12ft. high. Penang and Malacca. SYN. *Seaforthia malaiana.*

P. patula (spreading). *fl.*, spadix green when in flower, red when in fruit. *fr.* orange-yellow, ellipsoid, ⅔in. long. *l.* 4ft. to 5ft. long, unequally pinnate, oblong in outline, sheathing at the base. Stem erect, 9ft. high, smooth, ringed, swollen at base. Sumatra. A beautiful, dwarf species. (B. M. 6581.)

P. ternatensis (Ternate Island). *fl.*, branches of spadix spirally disposed. *l.* 12ft. long, with thirty to forty, two-nerved, lanceolate, falciform segments, the largest of which are 3ft. long. Stem simple. SYN. *Areca gigantea*, of gardens.

P. Veitchii (Veitch's). *l.* oblong, tapering at the base, truncate, deeply two-lobed at the apex, mottled green above, with reddish nerves, rich claret-coloured beneath. Borneo, 1879. A highly ornamental species. (F. d. S. 2405-6; R. G. 1880, 264.)

PINARDIA (of Necker). A synonym of *Aster.*

PINCERS. These are requisite in gardens, for drawing nails when unpacking cases, &c. Much inconvenience is caused. and lids of boxes rendered useless, when no Pincers are at hand for use with the garden hammer.

PINCKNEYA (named after an American botanist of the name of Pinckney). SYNS. *Pinknea, Pinkneya.* ORD. *Rubiaceæ.* A monotypic genus. The species is a small tree; it is usually grown in a greenhouse, but thrives very well in the open air, against a south wall, and in a compost of loam and peat. Propagated by cuttings of the ripened shoots, inserted in sandy peat, under a handlight.

P. pubens (downy). Bitter Bark-tree. *fl.* rose, purple-spotted, rather large, pubescent, bracteolate, disposed in terminal and axillary corymbs; calyx lobes pink; corolla funnel-shaped, with a five-cleft, recurved limb, beyond which the five stamens project. Summer. *l.* ample, opposite, stalked, oval, acute at both ends, tomentose beneath, as well as the branches. Branches opposite. *h.* 20ft. Carolina to Florida, 1786. (F. d. S. 1937.) This species is more conspicuous by reason of the large, pink bracts subtending the inflorescence, than for the purple-spotted corolla.

PINCUSHION FLOWER. *See* **Scabiosa.**

PINE. *See* **Pinus.** The name is also applied to several other genera.

PINE-APPLE (*Ananas sativa*). The Pine-apple is a native of tropical America; it has also become naturalised, and grows in abundance, in some of the hot parts of Asia and Africa. It was introduced into this country about the end of the seventeenth century, and, after some thirty or forty years, the plant seems to have been cultivated for the use of its fruit. In those days, the maintenance of a temperature sufficiently high to suit the plant's requirements was far more

Pine-apple—*continued.*

difficult to accomplish than now, when suitable structures and all the modern appliances for heating are at command. Little is recorded of the success attending Pine-apple culture when first attempted; but, after the introduction of hot-water pipes, and, doubtless, also from the cultural requirements being much better understood, its cultivation, both for private consumption and for market, was, for a time, generally practised with much greater success than had hitherto been possible. Less than twenty years ago, the importation of ripe fruits, chiefly from the Azores, began in earnest, to meet the increased demand; and Pine-growing has gradually decreased in this country, the space and the attention of cultivators being devoted instead to fruits, &c., that are in more general demand, require less heat, and are not to be imported in such an excellent condition. First-class English-grown Pine-apples are still considered by many to be the finest and best in the world; but, so long as fresh, well-swelled fruits of the Smooth-leaved Cayenne variety can be imported to arrive little inferior in quality, it is more than likely that English Pine-growing will not again be practised to the extent it was previously. There are, however, still many gardens from which Pine-apples are expected in greater or less quantity; in some, the work attending their culture is rather laborious, especially where the necessary bottom-heat has to be mainly obtained from the plunging material, which generally consists of Oak-leaves or tan.

PROPAGATION. This may be accomplished by seeds, crowns, gills, cuttings of the stem or dormant buds, and suckers. Seeds may be sown in shallow pans or pots of light, sandy soil, which should be placed in a bottom heat of about 85deg. or 90deg., and covered with a bell glass. The seedlings, when they are large enough to handle, should be potted in light, peaty soil, and grown on in a high temperature until they are large enough to be treated like ordinary plants obtained by other means. Crowns are procured from the points of the fruits; they should be inserted, so soon as the fruit is used, in small pots of rather dry soil, and be plunged in a strong bottom heat. Crowns are principally utilised when the variety is rather shy in producing suckers; they do not form such good plants, nor are they considered to produce such heavy fruits, as suckers. A longer period is also required to bring them to a fruiting stage. Gills are offshoots, something like small suckers, that are produced just below the fruit. They are not often used for propagating, except in the case of rare sorts. Cuttings of the stem, or propagation from dormant eyes, is another method pursued when suckers are scarce. The leaves may be removed from the stems of plants whose fruits have been cut, when the stems should be cut in pieces, or, better still, laid intact in shallow boxes, which should be thoroughly drained. They should be covered with at least 1in. of light soil, and panes of glass should be laid over the top. If subjected to bottom heat, most of the dormant buds which were formed at the base of each leaf will, in due course, start growth as young plants. They may be removed carefully, when large enough, and treated as seedlings. Suckers afford the chief supply for effecting an increase; they are usually procurable from plants when the latter arrive at the fruiting stage. After the fruit is cut, the suckers grow fast from the base, and it is often a good practice to allow them to remain on the old stools until they attain a large size. They may be detached, and potted off singly; but it is not advisable to do this during the winter months: from March, in spring, to a period not later than September, in autumn, should be taken as a limit. In the preparation of suckers for inserting, all that is necessary is to carefully remove them, by taking hold close to the base, and twisting gently, forward and

Pine-apple—*continued.*

backward, until they come off; afterwards, cut the end smooth with a sharp knife, and take off a very few of the smallest lower leaves. Suckers may be potted, according to their size, in clean pots, from 5in. to 8in. in diameter.

CULTIVATION. Where a quantity of Pine-apples are grown, it is usual to set apart structures for those in various stages of growth — one for suckers, one for succession plants, and another for those which have advanced to the fruiting stage. In all cases, provision must be made for plunging-beds, and there should be plenty of hot-water pipes for keeping a high temperature, without having to over-heat them and produce a very dry atmosphere. Pine-apples may be grown in pits, but they may be much better attended to in a house, which, for the various stages in the growth of the plants, may be a lean-to, hip-roofed, or a span-roofed structure. Provision should always be made for the full admission of light; this is a most important element in cultivation, as it is conducive towards keeping the plants dwarf and sturdy. The surface of the plunging-beds should be near enough to the glass to allow of the plants nearly touching the latter when fixed in position. There should be hot-water pipes passing through a hollowed chamber beneath a staging of slate or wood, fixed to hold up the plants, and form a division. The plunging material above the hollowed chamber, consisting of good Oak-leaves or tan, should be from 2ft. to 3ft. deep for maintaining heat over a long period. A small lean-to house is best for propagating, with a plunging-bed along the front, and a narrow passage at the back. When the plants become too large for this structure, they will be ready for the succession house, which may be hip-roofed or lean-to, on a higher and larger scale, with front and back passages. For fruiting Pine-apples, a span-roofed house is generally preferred for summer, to meet the requirements of strong-growing plants, and afford facilities for giving them an abundance of light; such an arrangement is not, however, always practicable, and the best has, consequently, to be made of the means at command.

Provision should be made, in Pine-houses or pits, for applying a thin shading for a few hours on bright summer days; but this must be fixed on rollers, and on no account be left down permanently. To these rollers a thicker covering, for use on cold nights, and in severe weather, may be fixed with great advantage, as the heat and moisture, inside the house, will be much preserved thereby, and this is of great importance when hard-firing becomes a necessity. Ventilation should chiefly be given from the top; but provision should also be made for admitting front air near where the pipes are situated, in case of such being required in summer. On hot days, if top ventilators are open, rapid evaporation of moisture takes place; this may be counteracted considerably by nearly closing the top when the shading is down, and giving air from the front instead. On no account must draughts be allowed.

The soil best suited for Pine-apples is one that affords the free passage of water, and the pots used should be thoroughly clean and dry both inside and out; they should also be well drained. Light, fibrous loam, which has been cut very thin, and stacked for a time sufficient to kill the grass, should form the main part of the compost. It should be torn up by hand, and only the rough, lumpy portions used. To it may be added some fibry peat similarly shaken out, about one-fifth part of rough, charred refuse, or some charcoal, and crushed bones, to the extent of half a bushel to about five barrow-loads of the compost. This should be prepared beforehand, and always made warm before being used. Animal manures, and anything tending to decay rapidly, should be excluded from soils intended for Pine-apple culture. If a stimulant becomes necessary, it is

Pine-apple—*continued.*

best applied when the plants require it, by means of diluted liquid manure. The chief provisions, under this heading, are, therefore, those of insuring thorough porosity in the soil, and good drainage: Pine-apples will never succeed in a compost that becomes at any time close and retentive, or in the least sour from being over-wet.

Pine-apples need never be placed in larger than 12in. pots; in these they may be most successfully fruited. In growing on suckers, and succession plants, an eye should be given to potting in sizes proportionate to giving a final shift into that above mentioned. Some cultivators adopt a system of planting-out Pine-apples when they arrive at the fruiting stage; but it is not generally practised. There are disadvantages, as, for instance, if anything should prove unfavourable to their well-being, it might not be so easily remedied as if the plants could be readily removed. A pot-plant, so soon as its fruit has been cut, may be easily taken elsewhere for producing suckers, and another, with the fruit ripening, put into its place. This would not be so readily accomplished were the system of planting-out adopted.

Watering must be conducted with great care in winter; sometimes it will not be advisable to apply any for weeks then, nor yet in early spring. When the application of water becomes necessary—a time readily known to practised cultivators by the plant's appearance—sufficient should be given to thoroughly soak the ball, and this should be of a temperature equally as high as that of the bottom heat maintained. It is well to examine the plants for watering at least once a week. Syringing, during the season when the plants are growing, should be practised at closing time in the afternoons; warm water must always be used. Evaporating troughs, on the pipes, kept filled with water, and frequent dampings of the walls and passages, will preserve a moist atmosphere; this, with a high temperature, is what Pine-apples require when growing as succession plants, and when the fruits are swelling. At the time the latter are ripening, water should be withheld, and a much drier atmosphere maintained; otherwise, the flavour will be affected.

In winter, the plants should be rested, but not subjected to a lower minimum night temperature than 65deg., that by day, in mild weather, being 5deg. or 10deg. higher. As the days lengthen, these figures may increase, until, in summer, 70deg. or 75deg. should be taken as a minimum for night. The bottom heat to be aimed at, through the spring and summer, is about 85deg.

INSECTS. Mealy Bug and White Scale are the most destructive insects to the attacks of which Pine-apples are subject. Both are very injurious, and are difficult to eradicate; it is therefore extremely important that their appearance should, if possible, be prevented. Whenever any are detected, measures for cleansing the plants should be at once taken in hand. Various remedies have been proposed and tried, amongst them being that of placing affected plants head downwards over a bed of fermenting horse-dung, in a frame which is kept closed for about an hour, when the plants are taken out and washed. Clean water, at a temperature approaching, but not exceeding, 130*deg.*, has also been recommended. Perhaps the most efficacious remedy, when properly applied, is paraffin, using a wineglassful to a gallon of warm, soft water. The plants should be laid on their side, and the mixture syringed on by one person, while another keeps it constantly agitated with a second syringe. The whole of the paraffin must be afterwards washed off with clean water, applied warm, and with some force.

SORTS. Pine-apples are somewhat numerous in varieties, but for all practical purposes only a few of the best are necessary. Indeed, the good qualities of the

Pine-apple—*continued.*

few leading sorts enumerated below have been sufficient to gradually lead to the discarding of many others of less merit. There are, however, a few others in cultivation.

Black Jamaica. Flowers purple. Fruit oval, somewhat pyramidal, bronzy-yellow when ripe, attaining a weight of from 4lb. to 5lb.; pips medium, prominent, flattened in the centre; flesh firm, rich, juicy, and highly flavoured. Leaves long, finely serrated, dark green, tinged with red. Habit tall and erect. This is undoubtedly one of the best of all varieties for fruiting in winter.

Charlotte Rothschild. Flowers lilac. Fruit large, cylindrical, or slightly barrel-shaped, with medium-sized crown; pips large, flat, golden-yellow; flesh yellow, and very juicy; weight from 7lb. to 10lb. Leaves broad, with strong spines, slightly curved, dark green above, mealy beneath. This fine variety requires a high temperature, plenty of light, and dry air, to ripen it properly.

Hurst House. Fruit pyramidal, with prominent pips; flesh juicy and rich; weight sometimes 6lb. Leaves short, recurved, with strong, thickly-set spines. The habit of this variety is very dwarf and compact; consequently, it is adapted for culture where space is limited. It is only of use as a summer variety. SYN. Fairrie's Queen.

Lady Beatrice Lambton. Flowers purple. Fruit pyramidal or conical, with medium or small crown; pips broad, flattened, orange-colour, with deep yellow in the furrows between; flesh pale yellow, remarkable for the abundance of its juice, flavour rich and excellent; average weight about 9lb. (a specimen weighing 11lb. 7oz. has been grown by Mr. Hunter, at Lambton Castle, Durham, where the variety was raised by the late Mr. Stevenson, in 1860). Leaves straight and erect, dark green, covered with whitish mealiness; spines strong, widely set. A large and exceedingly handsome variety, likely to prove, under good cultivation, one of the best for general use, and also for fruiting in winter. It is less spreading in habit than the SMOOTH-LEAVED CAYENNE.

Lord Carington. Flowers purple. Fruit long, pyramidal, dark orange; pips medium, nearly flat; flesh pale yellow, tender, rich, and highly flavoured; weight from 4lb. to 7lb. Leaves broad, thickly set with medium-sized spines. A fine winter variety of the JAMAICA section, first brought into notice by Mr. Miles, gardener to Lord Carington, Wycombe Abbey, Bucks.

Queen. Flowers lilac. Fruit cylindrical, rich deep yellow when ripe; pips medium or rather small, prominent; flesh pale yellow, remarkably juicy and sweet; weight from 3lb. to sometimes 8lb. in fine specimens. Leaves very short, broad, bluish-green, very mealy, with strong spines widely disposed. One of the best Pine-apples for general cultivation; it is unexcelled in summer and autumn by any other, but does not swell properly in winter. This is supposed to be the oldest Pine-apple we have. There are several sub-varieties grown, that known as the RIPLEY QUEEN being the best. It propagates freely, and ripens off its fruit quickly. QUEEN Pine-apples will keep in good condition for three weeks after they are ripe.

FIG. 155. SMOOTH-LEAVED CAYENNE PINE-APPLE.

Smooth-leaved Cayenne. Flowers purple. Fruit very large, cylindrical or somewhat barrel-shaped, dark orange-yellow; pips large, flat; flesh pale yellow, rich, and highly flavoured; weight from 6lb. to 9lb.; crown large. Leaves long, broad, dark green, almost free from spines. A very handsome variety, one of the best for fruiting in winter and early spring, when it is more juicy than any other. See Fig. 155. This is the variety which is so largely grown in the Azores, whence the English fruiterers obtain their principal supply of fruits from autumn

Pine-apple—*continued.*

until the following May. It does not produce suckers very freely.

Thoresby Queen. Flowers purplish-lilac. Fruit large, barrel-shaped, stouter and shorter than that of CHARLOTTE ROTHSCHILD; pips flat, swelling evenly; flesh deep orange-yellow, firm, moderately juicy; weight 6lb. to 8lb; crown small. Leaves taller than those of the common QUEEN, with very fine, thickly-set spines. Plant of dwarf and distinct habit. The flavour is not considered equal to the true QUEEN, but the variety is favoured in some parts. SYN. Bennett's Seedling.

PINE-APPLE FLOWER. A common name for *Eucomis punctata.*

PINE-APPLE SPRUCE GALL. *See* **Spruce Pine-apple Gall.**

PINE BARK BEETLES. Numerous species of small beetles (never exceeding ¼in. in length, and usually not over ⅛in. or ⅛in.) live below the bark of Fir-trees and other Conifers. They have a great general similarity in appearance, the body being usually nearly cylindrical, or slightly flattened from above downwards; the wing-cases are rounded down at the hinder end and

FIG. 156. TOMICUS LARICIS (much enlarged).

along the sides (see Fig. 156). The colour is a shade of brown, sometimes approaching pitchy-black; but it is often modified by a coating of short hairs of a different hue. The females burrow through the bark, and form a tunnel between it and the wood, a task facilitated by their form. The burrows vary greatly in details, each species of beetle forming its own characteristic and easily-recognised type of burrow. Along the sides of this the eggs are placed at intervals; and the larvæ, as soon as hatched, make burrows for themselves, usually diverging from that of the mother in such a way as to avoid interfering with each other. They have no legs, are fleshy, and are nearly white in colour. They become pupæ generally in their tunnels, and the beetles emerge from them about June and July, or there may be two broods. For egg-laying, they almost always select trees in an unhealthy state: hence, their ravages as larvæ do little real harm to forests; but, in the case of ornamental Conifers, they may, at times, destroy choice plants that, but for this additional foe, might have recovered. A number of the species found in this country, *e.g.*, *Hylesinus ater*, *H. opacus*, *Tomicus bidentatus*, and *T. Laricis* (see Fig. 156), as beetles, have been observed to injure the Firs and other Conifers by gnawing the bark of young shoots; and they are known to kill young plants, even up to the tenth year of growth, by stripping the bark from the base of the stem. Others, and among these notably *Hylesinus piniperda*, bore into young twigs, and eat out the pith in the centre, from the base towards the tip. The twigs die, dry up, and fall off, frequently in considerable numbers. If the leading shoots have been pierced, the form and value of the tree are largely affected. The genera and species of Bark Beetles are so much alike that the distinctive characters are recognisable only by practised entomologists: hence, it is vain to attempt to give descriptions of the many species that are to be met with on Firs and other *Coniferæ* in Britain.

Pine Bark Beetles—*continued.*

Remedies. The Beetles prefer to lay their eggs under the bark of tree-stumps, cut branches, brushwood, &c.: hence, it is advisable to remove and burn all such refuse, without delay, except so much as may be left as a trap to attract the females; and this also should be burned after the purpose is served. The traps should be renewed every three or four weeks, while the Beetles are out, *i.e.*, from early spring till the end of July, and again in late autumn, since some species appear in autumn, and hybernate. All diseased plants, if small, should be uprooted and burned. Badly-diseased trees, if too large to be entirely burned, should have the bark stripped off and burned. It is hardly possible to do anything to preserve a tree that has been severely attacked, more especially as it is almost always suffering from other causes; and the better course is to uproot and destroy all such trees at once. If the attack is slight, and the tree is a valuable one, it may be possible to stop the evil by measures to promote the growth of the tree, thereby rendering it unsuited to the taste of the insects. An insecticide, such as Gishurst's Compound or petroleum, may also be injected into such holes as can be discovered in the bark, in order to destroy the beetles or larvæ in them.

PINE-BARREN BEAUTY. *See* **Pyxidanthera barbulata.**

PINE, BLACK. *See* **Pinus austriaca.**

PINE BUD MOTH, or **PINE BUD TORTRIX.** *See* **Retinia.**

PINE, CLUSTER. *See* **Pinus Pinaster.**

PINE, DAMMAR. *See* **Dammara.**

PINE, KAURI. *See* **Dammara australis.**

PINELLIA (a commemorative name, given to this genus by Tenore). SYNS. *Atherurus, Hemicarpurus.* ORD. *Aroideæ* (*Araceæ*). A genus comprising three or four species of hardy, tuberous herbs, natives of North China and Japan. Flowers all fertile; spathe marcescent, the tube convolute, the blade oblong and concave; spadix naked at base, the appendix worm-like, elongated, exserted; peduncle solitary. Leaves tri- or pedati-sect, membranous; segments oblong-lanceolate or elliptic, acute; petioles elongated, sometimes bearing gum at apex. The species described below thrives in any sandy, well-drained border. It is readily propagated by division during winter, or at any time before growth has too far advanced.

P. tuberifera (tube-bearing). *fl.*, spathe with a narrow-cylindrical tube and an oblong lamina; spadix with a filiform appendage, twice as long as the lamina of the spathe. *l.*, adults trisected; segments oblong-elliptic, acute at both ends, the middle one nearly or quite twice the size of the lateral ones; petioles bearing tubercles. Japan, &c.

PINE LOPHYRUS. *See* **Pine Sawflies.**

PINE, MORETON BAY. A common name for *Araucaria Bidwillii.*

PINE, NORFOLK ISLAND. *See* **Araucaria excelsa.**

PINE SAWFLIES. Under **Lophyrus** and **Lyda** will be found some general remarks on the Sawflies that belong to these genera. The species are all more or less hurtful to Conifers, but *Lophyrus Pini* is the one generally denoted by the name of Pine Sawfly. The insects are heavy-bodied, with four transparent wings, which often show a play of iridescent colours. In the male they reach about ½in., and in the female about ¾in., in their expanse. The male is black. The female is pale yellowish-white, with black head, antennæ, and breast; and the back between the wings, and a large patch on the abdomen, are black. The eggs are laid on the leaves, in slits made by the females. The larvæ feed in company, eating the leaves from the tips downwards, and also

Pine Sawflies—*continued.*

gnawing the bark of the young twigs, and thus doing great damage to the Scotch Fir. They are usually light greenish-yellow in colour, more rarely pale yellow, or dark green above, and are sprinkled with minute black granules. The head is brown, with dark spots. When full-fed, the larvæ crawl under moss and leaves, or into crevices, and spin oval cocoons, about ½in. long, of very compact texture, and usually dull brown in colour.

The other Sawflies most injurious to Firs and to other Conifers in Britain, are the following: *Lophyrus frutetorum, L. sertiferus* (*L. rufa*), and *L. virens*; and of the genus *Lyda* the most hurtful are *L. erythrocephalus, L. nemorum,* and *L. stellatus.* In their general appearance and habits, they agree with *Lophyrus Pini,* differing only in minor details. It is unnecessary to enter into descriptions of the different species, since they are so much alike; the same means of destruction may be employed against all of them.

Remedies. Moss, loose bark, and other *débris,* amongst which the cocoons are spun, should be collected and burned. The larvæ may be hand-picked from the branches, or crushed on them, with good results. Naphtha and solutions of Hellebore have also been directed upon them successfully. They may be shaken from larger trees, and crushed under foot; or they may be prevented from re-ascending by putting a belt of any sticky compound round the stems of the trees.

PINE, SCREW. *See* **Pandanus.**

PINE STRAWBERRY. *See* **Fragaria chilensis grandiflora.**

PINE WEEVILS. *Hylobius Abietis* is a beetle very hurtful to the Scotch Fir, and to various other Conifers, as it feeds, in the perfect state, on the bark of the young shoots. It is seldom very destructive in gardens, or in pleasure-grounds, but does most harm amongst young trees growing in the neighbourhood of recently-felled plantations, where brushwood, &c., has been lying about for some time. The beetles are ⅜in. to ⅝in. long, dull black, with scattered tufts of yellow hairs. The thorax is narrowed in front, and the head is small, and bears a decurved proboscis, on which are the antennæ, abruptly elbowed at the tip of the long first or basal joint. The wing-cases are rough, with lines of pits and tubercles, and there are numerous small pits on the head. The beetles appear from May to July. They gnaw the buds and the bark of the twigs, interfering, in this way, with the development of the trees. The eggs are laid in crevices on stumps of Firs, on logs, and on cut branches; and the white, legless larvæ, on hatching, burrow into the wood, and feed on it, making galleries that increase in size with their own growth. At the end of the burrow, a cocoon is formed, by the full-fed larva, of the fragments gnawed by it in making the gallery. Here, in spring, it becomes a pupa, in which state it passes about four weeks.

Pissodes notatus and *P. Pini* belong to a genus closely allied to *Hylobius,* and are not less hurtful. They are, however, easily known from that genus by having the antennæ in the *middle* of the narrowed beak, while *Hylobius* has them situated quite near its tip. The thorax also is broader compared with the wing-cases. Both species of *Pissodes* are rather smaller than *Hylobius Abietis.* In general appearance and colour, they agree not a little with that beetle. They are of a pitchy-brown colour, but this is modified by a coating of yellowish-white scales or hairs, more conspicuous in certain parts. Their general appearance is shown in Fig. 157. Both are about ⅓in. long. The larvæ of *P. notatus* live under the bark of *living* trees of good size; and those of *P. Pini* in old stumps, &c., making winding galleries, in which, when full-fed, they spin oval cocoons of fragments of wood and silk. The beetles emerge from July

Pine Weevils—*continued.*

to September. As beetles, they destroy the young branches of Conifers by boring small holes in them, and sucking the sap (see Fig. 157). Resin is apt to flow out from the openings, and the branches die, and fall off.

Prevention. This is best insured by the removal and burning of the branches, &c., cut off in wood-cutting operations. The supply of food for the larvæ is thus stopped. The perfect insects may be caught by using, as traps, flat pieces of bark, laid on the ground under weights, and frequently examining them; from these the

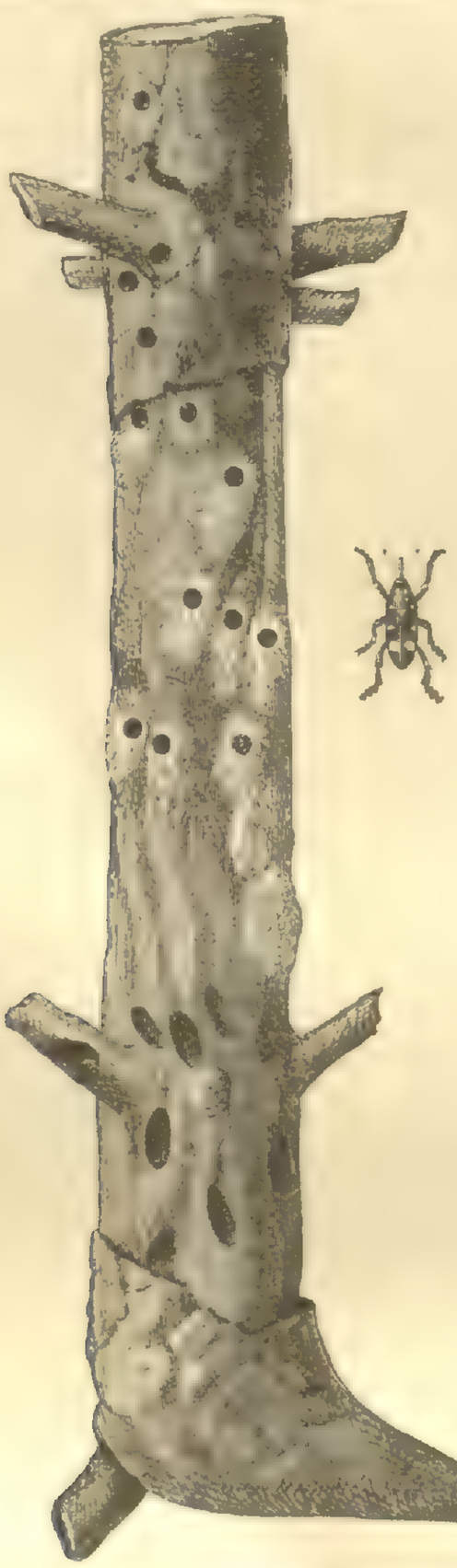


FIG. 157. PISSODES NOTATUS, showing Insect (natural size) and Ravages to Trunk committed by it. The bark has been removed from the middle of the trunk, to show the galleries.

beetles can be picked off. Or cut branches may be placed in suitable localities, and the beetles attracted to them may be shaken off and killed. A few logs should be left for a time, to induce the females to lay their eggs thereon; but they should be burned while the larvæ are still in them. Young Conifers should not be planted on the site of an old plantation, where numerous stumps serve as breeding-places for the beetles. Hand-picking is of use where the trees to be protected are few and small.

PINGUICULA (a diminutive from *pinguis*, fat; referring to the greasy texture of the plants). Butterwort. ORD. *Lentibularieæ*. A genus of greenhouse or hardy, terrestrial herbs, broadly dispersed (in boggy places) over the extra-tropical regions of the Northern

Pinguicula—*continued.*

hemisphere, a few being found in the Andes of America, extending as far as the Antarctic regions. Upwards of thirty species have been described, but probably not more than twenty are really distinct. Flowers terminal; calyx four or five-parted or bilabiate; corolla purple, violet, or yellow, bilabiate, the lobes all spreading, entire or emarginate; scape erect, one-flowered, leafless, ebracteate. Leaves radical, rosulate, entire, often greasy to the touch. The hardy species thrive in a marshy, boggy soil, and are propagated by seeds, by leaf cuttings, or by division. The greenhouse species thrive in well-drained pots of peat and sphagnum or in fibrous peat and pieces of broken pots, and may be increased by the same means. The under-mentioned species are the best for gardening purposes. They are all perennials.

P. alpina (alpine). *fl.*, corolla white; lips unequal; throat yellow, hairy; spur very short, conical. May and June. *l.* elliptic, slightly pilose above. *h.* 3in. Arctic Europe (Scotland), &c. (Sy. En. B. 1123.)

P. Bakeriana (Baker's). A synonym of *P. caudata*.

P. caudata (tailed).* *fl.* of a beautiful, rich, deep carmine, on long scapes, terminal. Autumn. *l.*, when young, in dense rosettes, fleshy, long, narrow, with slightly incurved tips; in older plants few, large, obovate, obtuse, with a thick, obscure midrib, dull pale green, with dirty-purplish margins. Mexico, 1881. A lovely greenhouse plant. (B. M. 6624: Gn., August, 1881.) SYNS. *P. Bakeriana* (G. C. n. s., xv. 541), *P. flos-mulionis* (B. H. 1872, 371).

P. flos-mulionis (muleteer's-flower). A synonym of *P. caudata*.

P. grandiflora (large-flowered).* *fl.* violet-blue, on radical scapes; corolla 1in. or more long, and nearly as much in width, with a broad, open mouth. Summer. *l.* in rosettes, light green, fleshy, oval or oblong, obtuse. South-west Ireland. A handsome bog plant. (G. C. n. s., iv. 27; Sy. En. B. 1122.)

P. hirtiflora (hairy-flowered). This much resembles *P. vulgaris*, but the flowers are paler, with a yellowish throat, sparsely glandular or glabrous, the peduncles and calyx are hairy, and the slender spur is straight or incurved. Mountains of Italy and Greece, 1885.* Hardy. (B. M. 6785.)

FIG. 158. PINGUICULA VULGARIS.

P. lusitanica (Portuguese). *fl.*, corolla lilac, with a yellow throat, ⅛in. long; lips nearly equal, the lower pouched from without; scapes very slender. June to October. *l.* ⅛in. to ⅜in. long, oblong, shortly petiolate, thin, succulent, obtuse, with incurved margins. *h.* 6in. Europe (Britain). (Sy. En. B. 1124.)

P. lutea (yellow). *fl.*, corolla yellow and golden, nearly 1in. long, campanulate, somewhat five-fid, the lobes scarcely distinct, sinuated or cut. June. *l.* obovate-elliptic, somewhat glabrous, 1in. long, slightly obtuse. *h.* 3in. North America, 1815. Half-hardy. (B. R. 126.) The form *edentula* has all the corolla lobes obcordate, and not laciniated. (H. E. F. 16, under name of *P. edentula*.)

Pinguicula—*continued.*

P. orchidoides (Orchis-like). *fl.*, corolla violet-purple, nearly 1¼in. long, somewhat five-parted, with a very short, constricted tube, and oblong-obovate, sub-equal lobes. October. *l.* spathulate-rotundate, 1¼in. to 1½in. long, 1in. broad, thick, pilose above. *h.* 3in. to 4in. Mexico, 1845. Greenhouse. (B. M. 4231.) This is probably simply a form or condition of *P. caudata*.

P. vallisneriæfolia (Vallisneria-leaved). *fl.* soft purple or lilac-purple, with conspicuous, white or pale centres, large. Summer. *l.* pale yellowish-green, linear, in dense tufts, and undulated at the margins. Mountains of Spain. Half-hardy. (Gn., April, 1878.)

P. vulgaris (common). Bog Violet; Butter-root. *fl.* violet; corolla with the lower lip much longer and broader than the upper; segments broad or obtuse; scapes several, 4in. to 6in. long, purplish. May to July. *l.* 1in. to 3in. long, appressed to the ground, oblong, obtuse, succulent, with incurved margins; petioles broad, very short. Europe (Britain), &c. See Fig. 158. (Sy. En. B. 1121.)

PINK. The typical species of *Dianthus*, from which the garden Pinks are supposed to have descended, is *D. plumarius*, a native of Eastern Europe, which has become naturalised in some parts of Britain. Since it was introduced to cultivation in this country, about the year 1629, numerous varieties and forms have been produced; but most of the improvement, from a florist's point of view, has been made during the present century. The common white Pink is a well-known occupant of almost all gardens; yet its flowers are so pure and sweet-scented that they are always welcomed. For cutting, all the varieties of garden Pinks are invaluable; they are also amongst the most popular and easily-grown of border plants.

Pinks may be propagated by seeds, by layers, or by cuttings; the latter are usually termed pipings. Seeds and layers are treated in precisely the same way as those of the **Carnation** (which *see*). Pipings usually answer best for the propagation of Pinks; they are produced in quantity round the base of old plants, and should be taken soon after the flowering season is past, and inserted, about 1in. apart, in very sandy soil, under hand-glasses, where they should be kept shaded from sunshine. All the preparation necessary is to remove a few of the lower leaves, taking care, however, to preserve the young buds, and to cut off the end, close to the bottom joint, with a sharp knife. The glasses should be kept on until roots are formed, when the young plants may have air gradually admitted to them, and be afterwards placed in a prepared border, in the open air.

Planting is best performed in September, so that the plants may become established and well rooted before winter; this is of great importance, as it considerably affects their future well-being. It should not be deferred later than the end of September. If planted in lines, a distance of about 1ft. should be allowed between them, and 9in. apart in the lines will afford sufficient space for the first year at least. Pinks succeed well in any fairly rich, loamy soil; but when the production of large flowers is the chief aim, a bed should be specially prepared for them. This should be raised above the ordinary ground level, and made up with turfy loam, leaf mould, and well-decomposed manure. Road scrapings, or anything of a similar gritty nature, are of great use for intermixing. Prepared beds should be made up about August, and be forked over occasionally; they should be from 1ft. to 1½ft. in depth. When raised above the path, an edging of some sort is generally necessary for keeping up the soil, preventing water from running off, and defining the beds. A top-dressing of horse-manure, 1in. thick, should be put on during March, and lightly forked in. Another top-dressing of manure may be given with advantage at the latter end of May, and water copiously applied, in the evenings, after hot, dry days, in summer. When large flowers are required, disbudding must be practised, and side growth removed at an early stage, in order to throw the strength into the limited number of buds left; when

Pink—*continued.*

the flowers are only required for cutting and for border decoration, this is unnecessary.

There is a valuable section of Pinks that are well adapted for forcing under glass, to flower before those outside. They will not withstand much heat, but may be gradually brought on in a cool temperature, and where plenty of air is admitted. Pinks for forcing should be thoroughly established. Cuttings must be inserted in pots, so soon as any are procurable, in spring, and placed in a gentle bottom heat. The young plants thus obtained may be grown on, under glass for a time, and then in a prepared bed all summer; they should be carefully lifted, and placed in pots, early in autumn, and wintered near the glass, in a cold frame.

Varieties. These may be divided into two classes, Show or Laced kinds and Border Pinks; nearly all of the latter are adapted for forcing, and are invaluable for ordinary decoration in outside beds. The following is a selection from the best varieties:

Border and Forcing Pinks. ANNE BOLEYN, pink, dark centre; large, very free-flowering. ASCOT, soft, fleshy-pink, with deep carmine centre; dwarf, extra fine and floriferous. CARNEA, flesh-colour, dark blotch at the base of each petal. DELICATA, white, dark plum centre, fringed. DERBY DAY, deep pink, laced with purple, large flower; distinct. FIMBRIATA MAJOR, pure white; a very large, fringed form of the old white variety, about three times the size; very free. HERCULES, white, rich dark lacing, very large. LADY BLANCHE, pure white, small; fine for forcing and buttonholes. LORD LYONS, deep rosy-purple, large, smooth, full flowers; free and distinct. MISS OWEN, centre dark velvety-maroon; exceedingly dwarf. MRS. GRIEVE, pink, laced with maroon, fringed; very distinct and floriferous. MRS. JAMES WELSH, rich crimson self, fringed; dwarf. MRS. PETTIFER, white, with light purple lacing; very useful. MRS. SINKINS, pure white, very sweet-scented; flowers very large; habit dwarf, sturdy, and very hardy; extra fine. MRS. W. M. WELSH, white, shaded yellow, edges slightly fringed; vigorous grower. NEWMARKET, rich pink, dark lacing; free. PILRIG PARK, pearl-white, edged pink, centre yellow and crimson; a beautiful single variety. ROBUSTA, pale pink, fringed, very fragrant; vigorous habit. ROSEA, rose, dark centre, fringed. RUBENS, dark flowers; dwarf and free habit. SNOWDON, pure white, very large; free-flowering and late. TOM WELSH, peach, laced deep crimson, fringed.

Show or Laced Pinks. ATTRACTION, fine deep ruby; good form. BEAUTY OF BATH, beautiful rose-lake. BERTRAM (Turner), red, broad lacing; extra fine. BOIARD (Turner), broad, smooth petals, beautifully laced bright red; extra fine. CLARA (Maclean), red, full size; very constant. CRITERION, light rose; neat. EMERALD, red lace, large and full; fine form. ENSIGN (Fellowes), broad red lace. GALOPIN (Turner), rosy-red lace; large and fine. GODFREY (Turner), bright reddish-purple; extra fine. HARRY HOOPER (Hooper), reddish-purple, bright lace; distinct. JAMES BLACK (Dicksons and Co.), pure white, plum-purple lacing; very large and constant. JESSICA (Turner), red, large, full flower. JOHN BALL (Maclean), dark plum-purple; extra fine. LADY CRAVEN (Hooper), fine red, very rich. MALCOLM DUNN, pure white, heavily laced maroon; full flower. MR. HOBBS (Looker), rosy-purple. MRS. DR. GRAY (Dicksons and Co.), pure white, narrow maroon lacing, neat and smooth; extra. MRS. JAMES GALLOWAY (Dicksons and Co.), pure white, very narrow peach lacing; one of the most delicately-marked varieties. MRS. WAITE (Turner), rosy-red; medium size. RELIANCE (Hooper), red lace, large and fine. SHIRLEY HIBBERD (Turner), rosy-purple; large, full, and fine. VOLUNTEER, rich rosy-purple. WILLIAM PAUL (Paul), clear rose lace, large, full flower; extra fine.

PINKNEA. A synonym of **Pinckneya** (which *see*).

PINKNEYA. A synonym of **Pinckneya** (which *see*).

PINK OF MY JOHN. A common name for **Viola tricolor** (which *see*).

PINNA. One of the primary divisions or leaflets of a pinnate leaf.

FIG. 159. PINNATE (SIMPLE) LEAF OF JASMINE.

PINNATE. When leaflets are arranged along each side of a common petiole. A Pinnate leaf of Jasmine is shown at Fig. 159.

PINNATIFID. Divided into lobes from the margin

FIG. 160. PINNATIFID LEAF.

nearly to the axis. A Pinnatifid leaf is shown at Fig. 160.

PINNATILOBED. When the leaves are divided to an uncertain depth.

PINNATIPARTITE. When the lobes pass beyond the middle and the parenchyma is not interrupted.

PINNATISECT. When the lobes are divided down to the midrib, and the parenchyma is interrupted.

PINNULE. The secondary division of a pinnate leaf.

PINUS (the old Latin name used by Virgil, &c.; probably derived from *pix, picis*, pitch; alluding to the resinous exudations). Deal-tree; Pine-tree. ORD. *Coniferæ*. A genus comprising about seventy species of mostly hardy, evergreen trees, rarely shrubs, broadly dispersed over the extra-tropical regions of the Northern hemisphere; a few being found between the tropics in Eastern Asia, the West Indies, and Central America. Flowers monœcious. Leaves dimorphous; primary ones small, scale-like, scarious or hyaline, marcescent, spirally many-seriate; secondary ones conspicuous, two to five in a whorl in the axils of the small scales, acicular, rather long, sometimes very long. Cones ovoid, conical, or oblong, usually sessile, solitary or fasciculate, slightly erect, horizontal, or reflexed, very rarely less than 1in., and sometimes more than 1ft., in length. Seeds furnished with ample wings, or wingless.

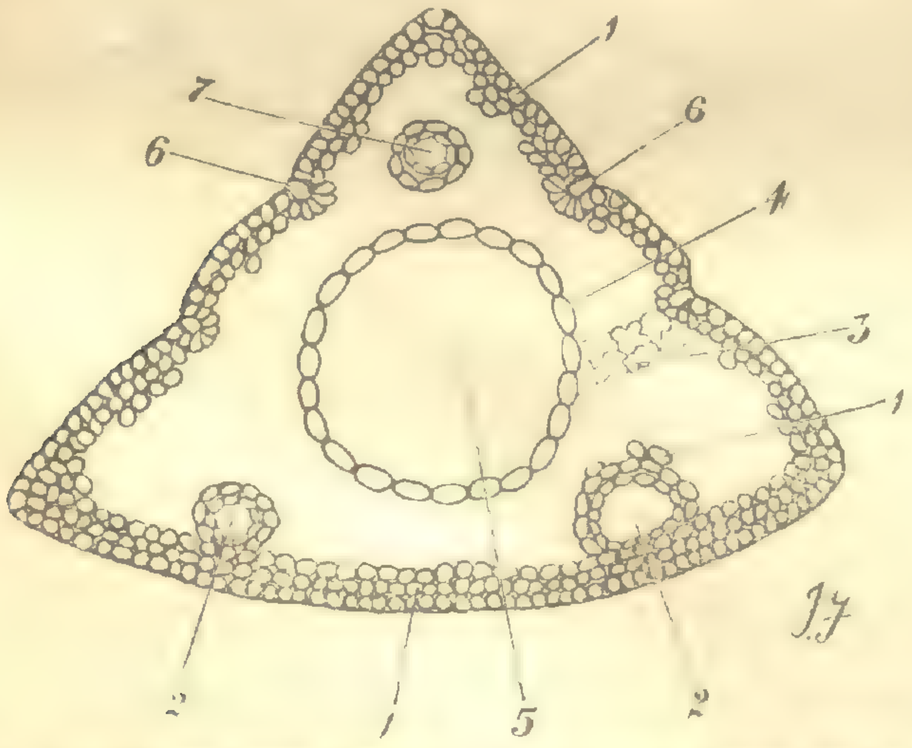


FIG. 161. TRANSVERSE SECTION OF LEAF OF PINUS EXCELSA.

1, 1, Strengthening Cells; 2, 2, Ducts, surrounded by Strengthening Cells; 3, Wavy Chlorophyll-bearing Cells that fill the entire space between the Strengthening Cells and the Bundle Sheath; 4, Bundle Sheath; 5, Position of Fibro-vascular Bundle; 6, 6, Stomata; 7, Internal Duct.

In most books, the species are classified according to the number of leaves in a sheath, but here the arrangement adopted is that proposed by the late Dr. Engelmann, published in the "Transactions of the St. Louis Academy of Science," and reprinted in the "Gardeners' Chronicle" for July 20th, 1880. Dr. Engelmann says: "I find, with Endlicher, the most valuable character in

Pinus—*continued.*

the fruit-scale, or, rather, to speak more correctly, I find that the form of the fruit-scale in this genus corresponds with a series of other characters which constitute two very natural sections of this genus. . . . . The sub-sections are distinguished by the position of the ducts within the leaf, whether peripheral, *i.e.*, near

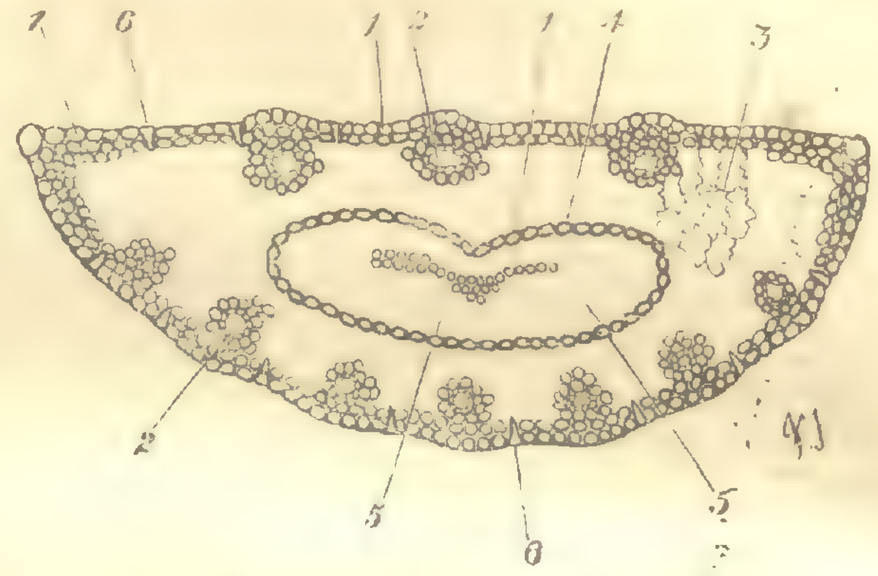


FIG. 162. TRANSVERSE SECTION OF LEAF OF PINUS SYLVESTRIS.

1, 1, 1, Strengthening Cells; 2, 2, Ducts, surrounded by Strengthening Cells; 3, Wavy Chlorophyll-bearing Cells that fill the entire space between the Strengthening Cells and the Bundle Sheath; 4, Bundle Sheath; 5, 5, Position of Fibro-vascular Bundles; 6, 6, Stomata.

the epidermis (see 2, 2, Figs. 161 and 162), parenchymatous, *i.e.*, in the cellular tissue of the leaf (see

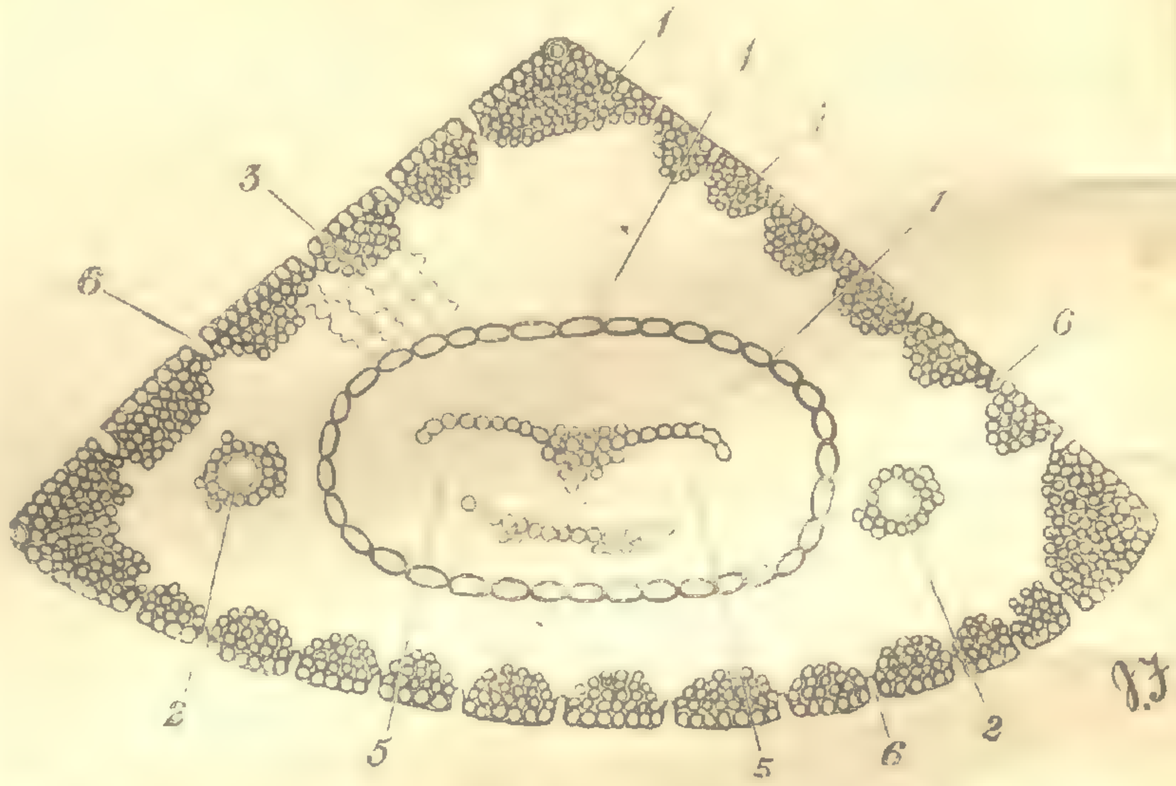


FIG. 163. TRANSVERSE SECTION OF LEAF OF PINUS COULTERI.

1, 1, 1, Strengthening Cells; 2, 2, Internal Ducts, surrounded by Strengthening Cells; 3, Chlorophyll-bearing Cells that fill the entire space between the Strengthening Cells and the Bundle Sheath; 4, Bundle Sheath; 5, 5, Position of Fibro-vascular Bundles; 6, 6, 6, Stomata.

2, 2, Fig. 163), or internal, *i.e.*, close to the bundle sheath. Subordinate to this character is the subterminal or lateral position of the female ament and the cone. Only after this may the number of leaves in a sheath be taken into consideration, and perhaps the presence or absence of strengthening cells (see 2, 2, Figs. 161, 162, 163) around the ducts. It will be found that thus not only natural, but, to some extent, even geographical, alliances are best preserved. . . . ." Want of space has prevented the characters of the sub-sections from being given; these will be found fully detailed in the works above-mentioned. For full descriptions, and more information respecting the species than it is possible to give in this work, the reader is referred to Loudon's "Arboretum et Fruticetum Britannicum," Carrière's "Traité Général des Conifères,"

Pinus—*continued.*

ed. 2, Gordon's "Pinetum," ed. 2, and Veitch's recently-published "Manual of the Coniferæ."

Section I. Strobus.

Anthers terminating in a knob or a few teeth, or in a short, incomplete crest. Leaves in fives, their sheaths loose and deciduous. Cones sub-terminal; apophysis with a marginal, unarmed umbo, generally thinner. Wood softer, lighter, less resinous.

EUSTROBI—
Buonapartea
excelsa
flexilis
Lambertiana
Loudoniana
monticola
parviflora
Strobus

CEMBRA—
Cembra
koraiensis

Section II. Pinaster.

Anthers mostly terminating in a semi-orbicular or almost orbicular crest. Leaves one to five in a bundle, their sheaths usually persistent. Apophysis with a dorsal umbo, mostly armed, generally thicker. Wood generally harder, heavier, and more resinous.

INTEGRIFOLIÆ—
aristata
Balfouriana
monophylla

SYLVESTRES—
densiflora
longifolia
Massoniana
Mughus
Pinea
sylvestris

HALEPENSES—
Bungeana
Gerardiana
halepensis
pyrenaica

PONDEROSÆ—
austriaca
chihuahuana
contorta
Grenvilleæ
Laricio
Montezumæ
ponderosa

TÆDÆ—
Coulteri
insignis
muricata
Pinaster
pungens
rigida
Sabiniana
tuberculata

AUSTRALES—
australis

CULTURE. "In arboriculture, as in landscape planting, some of the most ornamental and picturesque of trees are to be found amongst the Pines, while other species are greatly valued as *nurses* for more tender trees, for forming screens, &c. So various are the soils and situations in which the different species occur in their native countries, that there is scarcely a spot for which one or other kind is not suitable; thus, the Scotch or Wild Pine grows on the bleakest hills; *Pinus Pinaster* flourishes in shallow sands near the sea-shore; *P. rigida* attains its greatest perfection amidst the Cedar swamps of Virginia; *P. ponderosa* grows in the arid plains of Utah, where no other vegetation exists; and the Scrub Pine (*P. Banksiana*) straggles over the rocks in the cold and sterile countries east of Hudson's Bay" (Veitch).

The only satisfactory way to propagate the wild types of the various Pines is from seed, which may be sown, either in April, in sandy loam, in pots, under glass (and the young seedlings transplanted to the open ground in the following season), or in prepared beds outside. If the latter plan be adopted, the ground should

be made very fine, and the seeds sown in March or April, when the ground is in good condition. After sowing, pat the bed with the back of a spade, or pass a light roller over it, and then cover lightly. The smaller-seeded kinds only require a thickness of ¼in., or even less, of sandy loam over them; the larger ones, ½in. at most. If practicable, shade the beds, and keep them watered, until the young plants are sufficiently developed to bear full exposure. The following season, the seedlings should be placed in nursery lines, where they should not be allowed to remain more than two years without being again transplanted, or placed in the positions they are intended to occupy permanently. Probably, the best results would be attained were the seeds sown (and the seedlings not wanted thinned out) in the places where the trees were required to grow. This would, of course, involve much extra care and expense at first, but there can scarcely be a doubt that, to a great extent, the trouble would be repaid by the more rapid growth of the plants. The gold and silver variegated forms, those of a pyramidal habit, as well as the small, dense, cushion-like sports, must be increased by grafting on seedling plants of their respective types.

All the species described are hardy, except where otherwise stated.

FUNGI. Few trees are more subject to become the food of Fungi than the *Coniferæ*, the Fungi attacking the leaves or the branches in the fresh state, and the trunks and branches after the trees have been felled, or have fallen naturally. Even after the wood is employed in carpentry, in houses, &c., it is liable to the attacks of more than one "Dry Rot" producer, the worst of which is *Merulius lacrymans*. However, it is unnecessary here to consider Dry Rot and other Fungi that feed on the dead tissues, except in so far as these Fungi destroy sheds or other garden erections. The *Coniferæ* have a considerable number of parasites common to two or more of the species of trees; but each tree has certain kinds that, so far as is yet known, are peculiar to itself, *e.g.*, *Peziza Willkommii* on Larch, *Peridermium elatinum* on Silver Fir, &c. Among the Fungi more hurtful to *Coniferæ*, and especially to Firs of the genus *Pinus*, are the following: Several species of **Polyporus** (which *see*) live on the trunks of various Conifers, destroying the wood, and causing it to become soft and rotten. The tree is apt to break across at the part on which any kind of *Polyporus* has existed for some time. Among the worst of the British species are *P. mollis* on Scotch Fir, *P. vaporarius* and *P. borealis* on Scotch Fir and Spruce, and *P. annosus*, Fr. (*Trametes radiciperda*, Hartig). This last is one of the most dangerous species, because its habit of growth permits of very serious damage being done before danger is even feared. It gives rise to a state known as Red Rot, which causes the death of the tree. The injury is chiefly at the roots, and an attack is frequently unsuspected until the tree becomes pale green and dies. The roots are then found to be overgrown with the mycelium of the Fungus, which appears in cracks of the bark as whitish masses. The pileus is variable—in some cases, closely affixed to the root; in others, projecting from it, brown above, wrinkled and warty. The disease spreads gradually from a centre, destroying the trees within a progressively larger area, and without visible cause, as the Fungus passes from root to root in the soil.

The genus *Trametes* is nearly allied to *Polyporus* in structure and mode of life, and differs only in the former having the spore-bearing tubes imbedded in a substance similar to that in the pileus, while in the latter this substance differs from that in the pileus. One species, *T. Pini* (see Fig. 164), grows on living Fir-trees (more rarely on other Conifers), in which it also causes a

Pinus—*continued.*

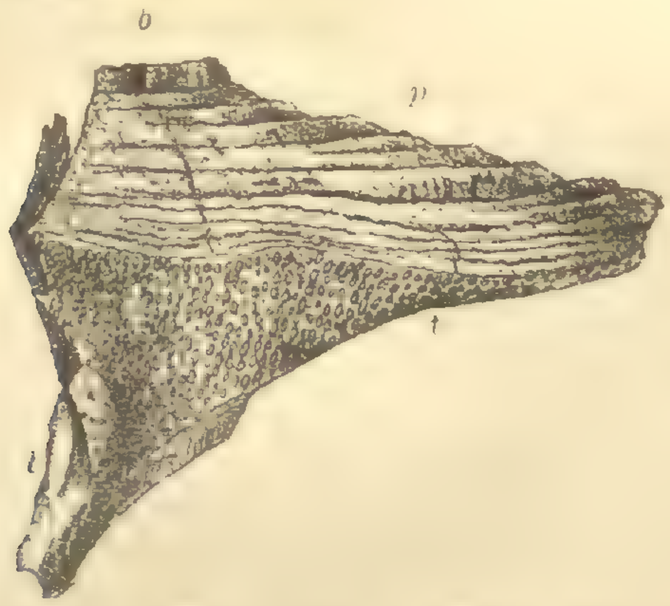


FIG. 164. TRAMETES PINI, showing (*p*) Pileus and (*t*) Openings of Spore-bearing Tubes. *b*, *b*, Bark of Fir-tree.

form of Red Rot. It is often the cause of injury to forests on the Continent; but it is too rare in Britain to give occasion for alarm.

FIG. 165. AGARICUS MELLEUS, showing, at the base, Mycelium of the Form called *Rhizomorpha fragilis*—*h*, Annulus, or Ring; *g*, Gills; *p*, Pileus.

Agaricus melleus (see Fig. 165) very much resembles *Polyporus annosus* in its effects upon the trees which it attacks; but it is far less particular as to its host, not by any means confining itself to Conifers. It is one of the Mushroom group of *Hymenomycetes*, with the spores produced on gills on the lower surface of the pileus. The latter part is convex above and varies from honey-colour to brownish, with blackish scales upon it. The pileus, or cap, varies from 2in. to 7in. in breadth. The caps spring up in large clusters, near the roots of trees, or on them, or low on the trunk (see Figs. 166 and 167). On tracing the mycelium, it will be found growing between the wood and the bark, in black, string-like or flattened bands, called *Rhizomorpha subcorticalis* and *R. fragilis*, which were formerly regarded as distinct and independent

Pinus—*continued.*

species (see Figs. 168 and 169). Other Agarics also are parasites, but none are equally dangerous with *A. melleus*.

Another Fungus injurious to Fir-trees is *Peridermium Pini*, which occurs upon both branches and leaves. The branches are generally destroyed by it, the leaves do not show signs of serious injury. *See* **Peridermium.**

FIG. 166. MASS OF AGARICUS MELLEUS ON ROOT OF YOUNG PINE—*a*, *a*, *a*, Mycelium in form known as *Rhizomorpha fragilis*; *b*, Very young Spore-bearers produced on *Rhizomorpha fragilis*; *d*, Older Spore-bearers (*Agaricus melleus*) produced by Mycelium of form known as *Rhizomorpha subcorticalis*.

The needles on various Conifers, in many parts of the country, are very frequently studded with one or more rows of small black bodies, which, under closer examination with a lens, are found to have a slit running from end to end of the upper surface. These are the perithecia of several species of Fungi grouped together in a genus called *Hysterium*. That on the Scotch Fir is *H. pinastri*. It is hurtful by causing the premature fall of the needles, and a consequent loss of nourishment

FIG. 167. AGARICUS MELLEUS. Group of young Spore-bearers (*c*) produced on *Rhizomorpha subcorticalis* (*a*), which is also shown spreading upwards at *d*; *b*, Sterile Mycelium in form called *Rhizomorpha fragilis*.

to the trees. In each perithecium are numerous relatively large cells (asci), inclosing eight long, slender, colourless spores. The tissues of the needles are early traversed by the mycelium of the Fungus; and the needles fall off usually at the end of their first year of life, but the Fungus is matured only after the leaves have been lying on the ground for some time.

It must be borne in mind that unhealthy external conditions, such as sterile soil, bad drainage, or lack of free

Pinus—*continued.*

circulation of air and light, such as prevails in badly-tended shrubberies, will destroy or weaken shrubs and trees, and that plants brought into an unhealthy condition by any of these causes are rendered far more liable to suffer harm from parasites. The larger Fungi, such as

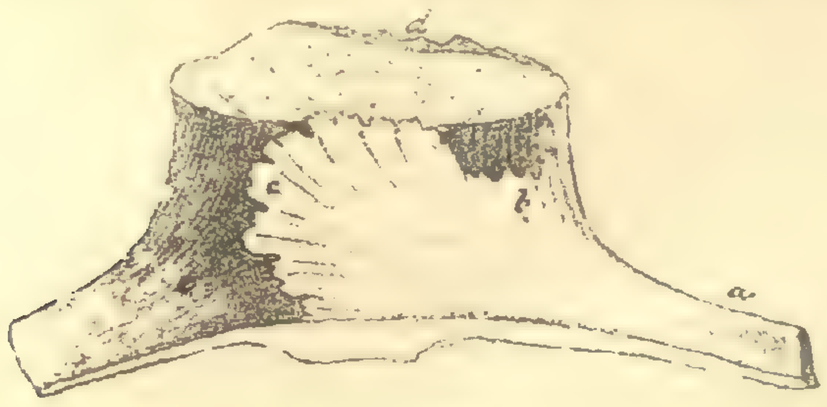


FIG. 168. RHIZOMORPHA FRAGILIS *var.* SUBCORTICALIS. Mycelium of *Agaricus melleus*, in the form it assumes when growing between the bark and the wood—*a*, Form intermediate between *fragilis* and *subcorticalis* expanding into the latter on the left; *b*, Portion where growth is slower; *c*, Lobed Margin; *d*, *d*, Margin that has reached cut surface of Stump; *e*, Wood of Stump of Fir-tree.

Polyporus, very often gain access to the stem or root through wounds left by the fall of branches or by careless pruning. Root parasites spread through the soil from diseased to healthy roots. Most of them can live for a considerable time on the dead roots; hence, young trees

FIG. 169. AGARICUS MELLEUS. Pine-root attacked by Mycelium (*a*) in the form known as *Rhizomorpha fragilis*.

should not be planted at once in the place of diseased ones that have been uprooted, however carefully the roots have been removed; and it is better, in any event, to let some time elapse, when trees are cut down, before planting others in their place.

Remedies. Whatever can promote healthy growth, especially the removal of the unfavourable conditions noted above, must be regarded as of the greatest importance as a preventive of disease due to the attacks of parasites. To prevent the spread of the root Fungi, Dr. Hartig recommends that narrow trenches be dug round the infected area, thus cutting the roots and preventing the spread of mycelium. *Polypori* on stems and branches usually denote that the wood is attacked for some distance around the spots, and that the prospect of saving the trees is not great; though, in the case of choice trees, it may be worth while to scoop away the diseased part, and to fill up the cavity in such a way as to prevent water lodging in it. Dead or dying trees should not be left standing to spread disease. Dead branches should be removed, and ragged stumps should be trimmed, and coated with some compound to prevent water and Fungus spores from getting into them. Branches attacked by *Peridermium Pini* should be cut off and burned, and Senecios should be uprooted from the neighbourhood of Fir-trees, even though the connection of *P. Pini* with *Coleosporium Senecionis* still demands investigation.

Pinus—*continued.*

Hysterium Pinastri can, probably, best be combated by the destruction of the Fungus in the needles; and, with this view, all fallen branches, bearing leaves and *débris* from trees attacked by this Fungus, should be collected, as far as possible, and burned.

In crowded shrubberies and woods, and in shady situations, the needles of Conifers are apt to be overgrown with Fungi of the group of *Fumago*, with an alga, *Pleurococcus vulgaris*, &c., which form a dark coat, like soot, on the needles. This coat prevents the latter doing their work for the welfare of the plant, and is thus hurtful, even though the plants forming it do not directly absorb food from the needles. The most effectual remedy is thinning out the shrubberies, and allowing better access of light and air.

INSECTS. Pines, Scotch Firs, and other Conifers are very subject, in forests, to the attacks of various kinds of insects; and they are liable to injury from the same insects, though in a less degree, in pleasure-grounds and gardens. The roots are sometimes injured by the operations of Cockchafers and Mole Crickets; and some of the Bark Beetles live in them in the same way as they live in the stems. The wood of the stems is bored into, and seriously damaged, by the larvæ of certain species, of which may be mentioned *Sirex*, as frequently present, the Goat Moth occasionally, and the Pine Weevils. Sickly trees often have their death hastened by the ravages of various species of small beetles (*see* **Pine Bark Beetles**) chiefly belonging to the family *Scolytidæ*; and the young branches, and the trees themselves while young, are often killed by these beetles, and by the larvæ of certain small moths, all of which bore into the branches and young stems, nearly or quite to the pith, and tunnel up them towards the tips, causing them to wither and fall. *See* **Retinia.** Several beetles are very hurtful in the mature state, by gnawing the bark off young twigs and young stems, or by puncturing the bark (*Pissodes Pini* and *P. notatus*). They thus cause an outflow of resin from each puncture. The larvæ of certain moths of the genus *Retinia* also cause an outflow of resin, which by *R. resinana* is made into a shelter that looks remarkably like a gall). The buds also are injured by these insects. The thinner branches of Scotch Firs are often swollen to twice their natural thickness by Gall Mites of the genus *Phytoptus* (*see* **Mites**), the effect of which is, frequently, the death of the branches. These galls should be cut off and destroyed, to prevent the disease spreading. The needles or leaves are eaten by numerous insects, of which the more injurious are Sawflies (*see* **Pine Sawflies**) and Moths. Of the latter, we may specify the Pine Beauty,

FIG. 170. PINE BEAUTY MOTH (*Trachea piniperda*).

Trachea piniperda (see Fig. 170), a heavy-bodied insect, with variegated wings of a reddish-brown colour, mottled with orange, yellow, white, and sometimes green; the Bordered White (*Fidonia piniaria*), a Geometer in which the male is white and black above, with feathered antennæ, and the female is dull orange-brown, with slender antennæ; and the Carpet Moths (*Thera firmata*, &c.), similar in form to the last, but with the sexes alike, the antennæ slender, and the fore-wings brown or chestnut, with a broad, darker cross-bar. Several small species of the *Tortricina* live, as larvæ, between needles of *Coniferæ*, spun loosely together, and

Pinus—*continued.*

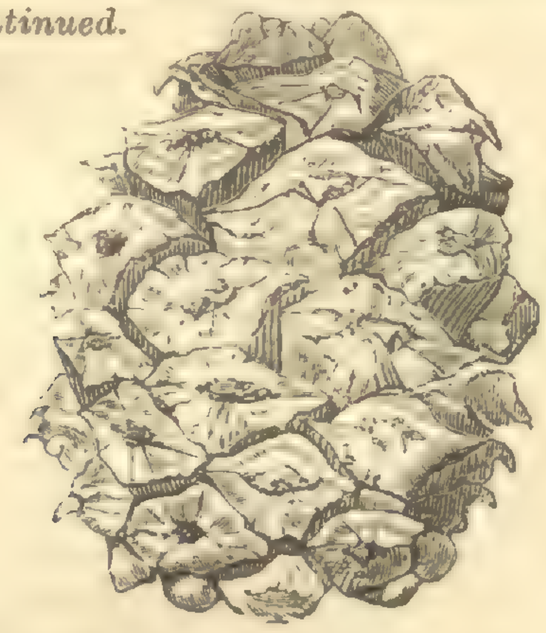


FIG. 171. CONE OF PINUS BUNGEANA.

some do considerable injury. But, on the whole, the moths seldom do serious harm to Conifers in gardens or pleasure-grounds, though they frequently do much damage in forests. The Sawflies are more to be dreaded than the moths.

Pinus—*continued.*

Pines and other *Coniferæ* are very liable to the attacks of numerous forms of Aphides, some of which feed on the needles, and others on the branches or in the young buds. The latter, for the most part, belong to the genera *Chermes* and *Lachnus*, both of which usually have a coating of filaments like a small tuft of white cotton, secreted by, and protecting, the body; and they are, therefore, rather easily detected on the bark. The two genera are easily distinguished from one another, since *Lachnus* has short, stumpy honey-tubes on its back near the end of the body, and one of the veins of the front wing that run to the hind margin has two branches; while in *Chermes*, the honey-tubes are not present, and the veins of the front wings are all unbranched. The number of species is too great to permit of a description being here given of each one that is injurious to *Coniferæ*; but one producing a gall resembling a miniature Pine-apple, is referred to under a separate heading (*see* **Spruce Pine-apple Gall**). Several kinds of *Psylla* also feed on *Coniferæ*. In none of the Conifers would the result be worth the

FIG. 172. PINUS CEMBRA.

Pinus—*continued.*

trouble and expense of treating the plants with any of the washes or other substances that are successful against Aphides in general, except, perhaps, for the protection of very choice young plants.

The appropriate treatment to prevent or to remedy the attacks of insect foes will be found under the various headings referred to, except for the leaf-destroying moths. For these, the most successful treatment will be found to be beating or jarring the branches, and crushing all larvæ that fall to the ground.

FIG. 173. BRANCH OF PINUS CONTORTA.

P. aristata (awned-coned). *l.* in fives, thickly set all round the branches, three-sided, abruptly pointed, entire, exuding white resin on their surfaces; those on young trees 1in. to 1¾in. long, half a line wide; on old specimens, scarcely 1in. long, thickly placed all round the branchlets. *cones* purplish-brown, oval, blunt-pointed, often appearing as if varnished, 2¼in. to 2¾in. long, 1½in. broad; scales awned. Branches spreading, often contorted, covered with smooth, thin bark. *h.* 40ft. to 50ft. California, 1870. (G. C. n. s., iv. 549.)

P. australis (Southern). *l.* in threes, 8in. to 9in. long, brilliant green, rather stout and reflexed when fully grown; sheaths from 1½in. to 2in. long when young. Buds large, imbricated, and free from resinous matter. *cones* 7in. to 8in. long, 2½in. broad, of a rich chestnut-brown colour, cylindrical, tapering to a blunt point. Branches few, robust, irregularly placed. *h.* 60ft. to 70ft. Southern United States. Hardy in the Southern Counties.

P. austriaca (Austrian).* Black Pine. *l.* rich, glossy dark green, rigid, sharp-pointed, erect, rounded on one side, and slightly channelled on the other, from 2½in. to 5in. long; sheaths short, persistent. *cones* reddish-brown, 2in. to 3in. long, with less elevated, smooth and shining scales; seeds winged. *h.* 75ft. to 100ft. Austria, 1835. A handsome species, "sufficiently hardy to develop its beauty in the bleakest and most exposed situations." Its method of propagation is similar to that described for *P. Pinaster*, but the necessity of transplanting the one-year-old seedlings is even greater, as otherwise the roots are deficient in compactness, and grow in a straggling manner, which transplantation corrects and modifies. SYNS. *P. Laricio austriaca*, *P. nigra*. (G. C. n. s., ix. 275.)

P. a. aurea (golden). A fine, free-growing form, with gold-tinted foliage.

Pinus—*continued.*

P. Balfouriana (Balfour's). Fox-tail or Hickory Pine. *l.* light green, rigid, short, very glaucous on the inner face, appressed, forming tufts 1ft. or more long at the ends of the branches. *cones* oval, about 2½in. long, and half as much in diameter; scales hard, coriaceous, with a small hook, curved upwards. *h.* 40ft. to 50ft. California, 1852. An alpine species, usually with a pyramidal outline. (G. C. n. s., v. 332.)

P. Benthamiana (Bentham's). A synonym of *P. ponderosa*.

P. Bolanderi (Bolander's). A synonym of *P. contorta*.

P. Boursieri (Boursier's). A synonym of *P. contorta*.

P. Bungeana (Bunge's).* Lace-bark Pine. *l.* bright pale green, rigid, triquetrous or three-angled, compressed and sharply pointed; sheaths short, deciduous. *cones* small. Branches long and slender. *h.* 70ft. to 80ft. China, 1846. A beautiful and distinct species, rare in cultivation. See Fig. 171. (G. C. n. s., xviii. 8.)

P. Buonapartea (Buonaparte's). *l.* in fives, but sometimes six, seven, eight, or nine in the same sheath, glaucous-green, angular on the inner face, very slender, 5in. long. *cones* straight, nearly cylindrical, 10in. to 12in. long, 3in. to 4in. in diameter; seeds large, with broad wings 1in. long. Trunk straight, furnished with long, slender branches in regular whorls, and pendent branchlets 2ft. to 3ft. long. *h.* 130ft. Sierra Madre. A noble, tolerably hardy tree.

P. californica (Californian). A synonym of *P. insignis*.

P. carpatica (Carpathian). A synonym of *P. Mughus*.

P. Cembra (Cembra).* Swiss Stone Pine. *l.* marked with silver lines, slender, flexible, triquetrous, three-angled, with rough edges, 2in. to 5in. long; sheaths small, deciduous. *cones* erect, oval, 3in. to 4in. long; scales smooth, terminating in a broad, obtuse spine; seeds about ½in. long, edible. *h.* 50ft. to 150ft Central Europe and Siberia, 1746. A very slow-growing species with a close, erect, symmetrical habit, and remarkable in the fact that the seeds do not vegetate until the second spring. See Fig. 172. There are numerous varieties; that known as *pumila* is a dwarf, stunted bush, rarely exceeding 4ft. in height; its leaves and cones are shorter than those of the type.

P. chihuahuana (Chihuahua). *l.* in threes, very rarely in fours, finely toothed along the edges, 2in. to 3in. long, glaucous above, light green beneath. *cones* 1in. to 1½in. long, smooth, egg-shaped, *h.* 30ft. to 50ft. Chihuahua Mountains, North Mexico.

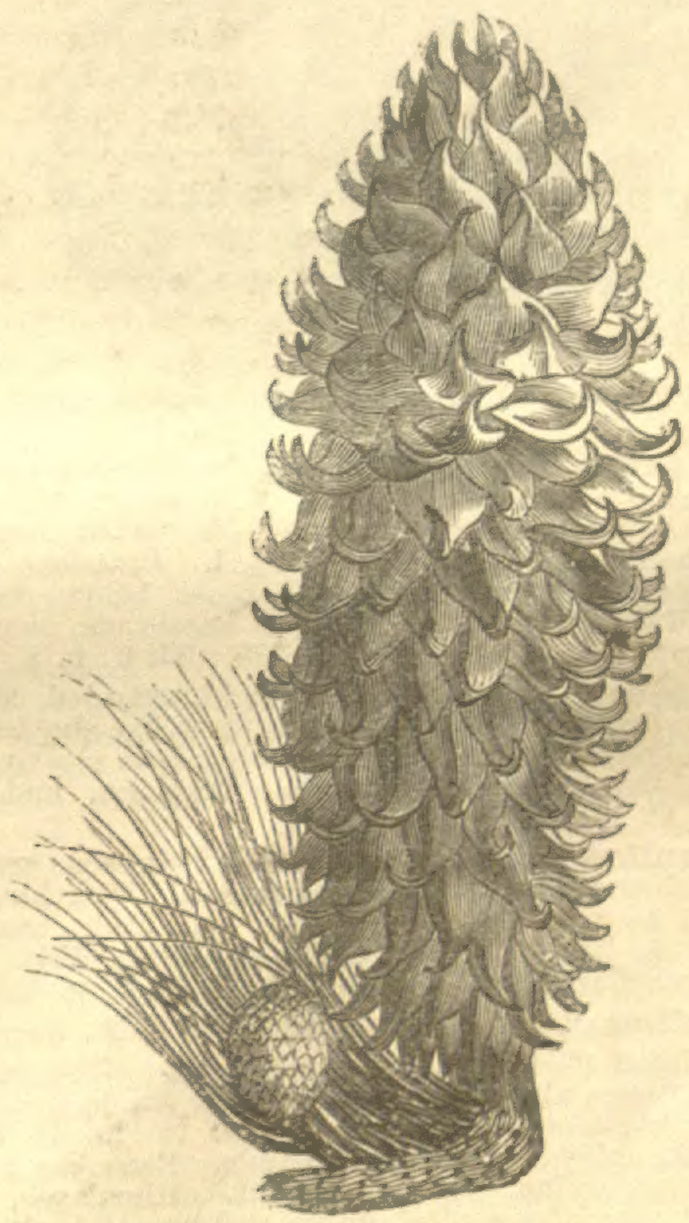


FIG. 174. CONE OF PINUS COULTERI (much reduced).

P. contorta (twisted). *l.* bright green, small, from 1in. to 2in. long. *cones* ovoid, almost spherical, about 1½in. long, very persistent. Branches numerous, sub-erect or spreading. *h.* 25ft. to 30ft. California, 1831. This species, "in its young state, in this country, is a compact, pyramidal, densely-branched tree, with the branches much twisted or gnarled, and well furnished with grass-green foliage" (Veitch). See Fig. 173. (G. C. n. s., xix. 45.) SYNS. *P. Bolanderi*, *P. Boursieri* (F. d. S., 1854, 934 b).

P. c. Murrayana (Murray's). This form makes a much taller, and straighter tree than the type, from 80ft. to 120ft. high, and 4ft. to 6ft. in diameter, with light green leaves, mostly about

Pinus—*continued.*

2in. long, a conical head, and thin, scaly, light greyish-brown bark. California. SYN. *P. Murrayana.*

P. Coulteri (Coulter's).* *l.* beautifully glaucous, rigid, triangular and flattened, incurved, clustered at the extremities of the branchlets, 9in. to 12in. long; sheaths long. *cones* very large, about 12in. long, 6in. in diameter at the broadest part, and weighing from 4lb. to 5lb.; scales very thick, woody, armed with a strong, hooked spine, yellowish-brown. Branches spreading, with the extremities ascending. *h.* 50ft. to 70ft. California, 1832. A very handsome and distinct species. SYN. *P. macrocarpa.* See Fig. 174. (G. C. n. s., xxii. 409.)

P. densiflora (dense-flowered). *fl.*, male catkins clustered into a thick, cylindrical spike, from 2in. to 3in. long. *l.* bright green, rather stiff, from 3in. to 4in. long, rounded on the upper surface, channelled beneath, slightly scabrous or roughish, crowded towards the extremities of the branchlets. *cones* about 2in. long. Trunk tapering; branches ascending. *h.* 40ft. to 50ft. Japan. (R. H., 1874, 273.)

P. Don Pedri (Don Pedro's). A synonym of *P. Loudoniana.*

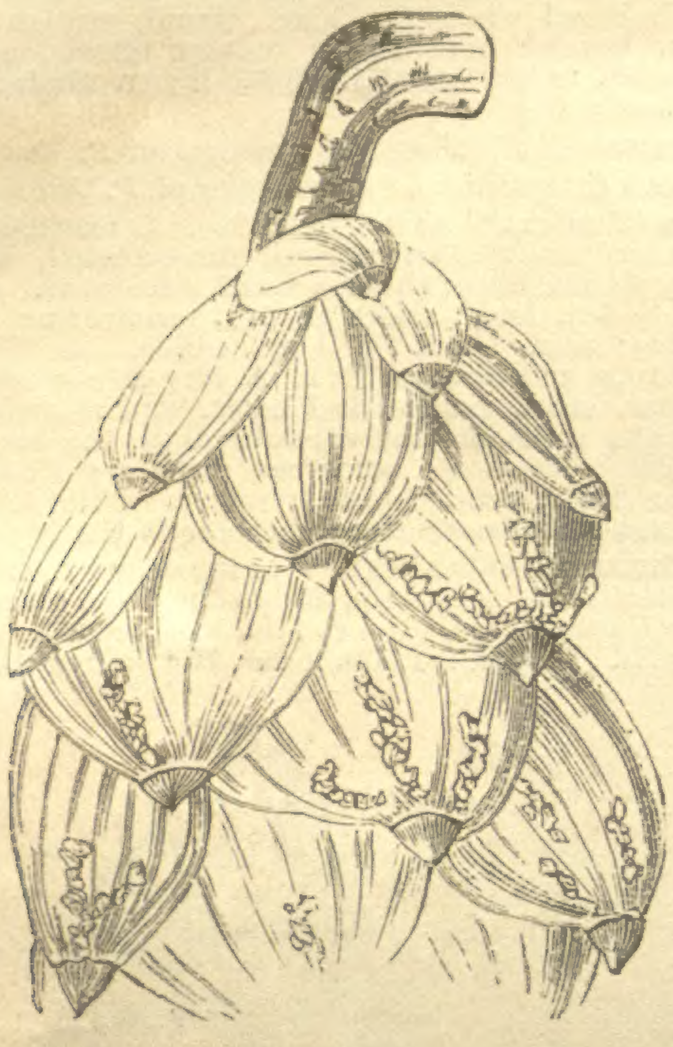


FIG. 175. LOWER PART OF CONE OF PINUS EXCELSA.

P. excelsa (tall).* Bhotan Pine. *l.* glaucous-green, very slender and flexible, drooping, triquetrous, with rough edges. *cones* cylindrical, pendulous, slightly curved, 6in. to 8in. long; scales large, wedge-shaped, loosely imbricated. Branches regularly whorled, the upper ascending, and those below decumbent. *h.* 60ft. to 150ft. Himalayas, 1827. A handsome, slender tree, of rapid growth. See Figs. 175 and 176. (G. C. n. s., xix. 244.)

P. flexilis (pliant). White Pine. *l.* rigid, crowded, about 2in. long. *cones* from 4in. to 5in. long; scales wedge-shaped. *h.* 5ft. to 50ft. California, 1851. A slow-growing tree, closely allied to *P. Cembra*, but having more flexible branches, and a bushy habit. (G. C. 1875, 376.)

P. f. albicaulis (white-stemmed). *l.* light glaucous-green, rigid, erect or sub-erect, triquetrous, compressed, 1½in. long. *cones* ovoid, 2in. to 2½in. long. Branches and their ramifications numerous. *h.* 20ft. to 30ft. South California, 1846. A slow-growing, irregular-shaped species. (J. H. S. i., p. 236.)

P. Fremontiana (Fremont's). A synonym of *P. monophylla.*

P. Gerardiana (Gerard's). *l.* glaucous-yellowish-green, rather rigid, triquetrous, abruptly pointed, 4in. to 5in. long. *cones* subglobose or ovate-oblong, sometimes 4in. to 5in. in diameter; scales thick, spiny; seeds large, edible. Branches ascending, lower ones spreading. *h.* 40ft. to 50ft. Himalayas, 1830. A handsome tree, with a conical outline and smooth bark.

P. Grenvilleæ (Grenville's). *l.* in fives, 12in. to 14in. long. *cones* solitary, pendulous, narrow, conical, about 15in. long. *h.* 60ft. to 80ft. Colmia, 1881. A fine and striking, tender tree. (G. C. n. s., xv. 113.)

P. halepensis (Aleppo).* *l.* rather light, slender, from 3in. to 5in. long, clustered at the extremities of the branchlets, sometimes in threes, and of but two years' duration. *cones* at first acutely conical, about 2½in. long, ultimately much shortened and rounded; scales broad, flat, yellowish-brown. Branches slender. *h.* 40ft. to 50ft. Levant, 1683. (G. C. n. s., xxii. 553.)

P. insignis (remarkable).* Monterey Pine. *l.* dark green, slender, soft, flexible, twisted, slightly appressed, 4in. to 6in. long. *cones*

Pinus—*continued.*

very ornamental, 4in. to 5in. long, obtuse at the base, pointed at the apex; scales spineless, smooth, glossy orange-brown in colour. Branches dense. *h.* 80ft. to 100ft. California, 1833. This is described as one of the handsomest of all the Pines; it is, however, only hardy enough to bear the winter in mild south and south-west climates. A sheltered position is at all times most essential. SYNS. *P. californica, P. radiata.* (G. C. n. s., ix. 108.)

P. koraiensis (Corean). *l.* bright glossy green on the outer and broader side, and silvery on the two inner ones, slender, trigonal, 3in. to 4in. long, edges roughish. *cones* almost cylindrical, very obtuse at both ends, 5in. long; scales hard and leathery, the points recurved. Branches ascending. *h.* 20ft. to 30ft. Corea and Japan, 1861. An elegant species, with a compact habit, and forming a densely-rounded head.

FIG. 176. BRANCH OF PINUS EXCELSA.

P. Lambertiana (Lambert's). Sugar Pine. *l.* bluish-glaucous-green, triquetrous, the edges rough, slightly twisted, clustered towards the ends of the branches. *cones* cylindrical, tapering at the apex, 15in. to 20in. long, and 3in. to 4in. in diameter; scales large, loosely imbricated; seeds large, edible, of a nutty flavour. Branches pendulous. *h.* 150ft. to 300ft. California, &c., 1827. This, one of the tallest of all Pines, has an enormous girth, the massive, perpendicular trunk being generally bare of branches two-thirds of its height from the ground. It stands the English climate well, and seldom suffers in the severest winters. It has an elegant appearance, while growing, during its infancy, and early displays a remarkable magnitude of trunk in relation to its height. In its native country, it is found covering districts of pure sand.

P. Laricio (Larch-like).* Corsican Pine. *l.* spreading, and curved or wavy, 6in. long, or less. *cones* pale brown, closely resembling those of *P. austriaca* in size and shape; scales with a very short point; seeds winged. Branches not numerous. *h.* 100ft. to 150ft. South Europe, 1814. "This Pine is easily recognised by its strict, erect habit; by its shortened branches, which sometimes show a tendency to curve in a direction round the tree and upwards; and by its large, twisted, glaucous foliage" (Veitch). It is better suited for richer soils, in lower situations, than many other Pines, and is therefore well fitted for planting out when a bold and prominent tree is needed in extensive grounds of park-like pretensions. See Fig. 177. (G. C. n. s., xxi. 15.)

P. L. austriaca (Austrian). A synonym of *P. austriaca.*

P. L. karamana (Karamana). *l.* in pairs, arranged in tufts at the ends of the upturned branches, 6in. to 8in. long, dark green. *cones* solitary or in pairs, spreading, 4in. long, 1½in. thick, elongated, ovoid-conical, resembling those of the Austrian Pine, but much larger. Bark pale brown. Asia Minor, 1884. (G. C. n. s., xxi. 91.)

P. L. Pallasiana (Pallas'). *l.* rigid, sub-erect or erect, sparsely set towards the ends of the branchlets, 6in. long. *cones* as large

Pinus—*continued.*

as, or larger than, in the type. *h.* 60ft. to 80ft. Crimea, 1790. SYN. *P. taurica.*

FIG. 177. PINUS LARICIO.

P. L. pygmæa (dwarf). "A dwarf, dense bush, with all its branches and their ramifications much shortened, and with the foliage clustered in thick tufts at their extremities" (Veitch).

Other varieties of *P. Laricio* are: *compacta*, *contorta*, *nana*, and *pendula*.

FIG. 178. BRANCH OF PINUS LONGIFOLIA, with Male Catkins.

P. longifolia (long-leaved). *l.* in threes, 12in. to 14in. long, very slender, three-edged, of a bright glossy green, finely serrated, pendulous. *cones* either singly or in clusters varying from three to five in number, in regular whorls, 5in. long, and 2½in. to 3in. in circumference near the base, ovate, very smooth, glossy, and hard; scales much thickened at the ends, and with a large, thick, hooked beak. Bark rough. Branches irregularly and thinly scattered. *h.* 60ft. to 100ft. India. Greenhouse. See Fig. 178.

Pinus—*continued.*

P. Loudoniana (Loudon's). *l.* in fives, 5in. to 6in. long, angular on the inner face. *cones* quite straight, tapering to the point, 12in. to 14in. long, 3in. to 4in. in diameter; seeds very large, with broad wings 1in. long. Branches in whorls, slender and horizontal; lateral ones long, very slender, divided and drooping. *h.* 140ft. Mexico. The timber of this tree is highly esteemed, being of excellent quality. Hardy in the West of England. SYN. *P. Don Pedri.*

P. macrocarpa (large-fruited). A synonym of *P. Coulteri.*

P. maritima (sea). A synonym of *P. Pinaster.*

P. Massoniana (Masson's). *l.* deep green, twisted, 4in. to 6in. long, rounded or convex above, channelled beneath; edges slightly scabrous. *cones* very small. *h.* 70ft. to 80ft. Japan, 1854. Closely allied to *P. densiflora*, but attaining a greater height, with branches longer and more spreading, and the branchlets stouter. (S. Z. F. J. 113, 114.)

P. monophylla (one-leaved). *l.* rigid, glaucous-green, curved, from 2in. to 3in. long. *cones* from 2in. to 3in. long, without scales. Branches numerous and slender. *h.* 20ft. to 25ft. California, 1847. A small, slow-growing species, with a dense, bushy head. SYN. *P. Fremontiana.* (G. C. n. s., xx. 44.)

FIG. 179. BRANCH OF PINUS PINASTER.

P. Montezumæ (Montezuma's). *l.* in fives, 3in. to 4in. long, rather stout, rigid, three-edged, and rough at the angles, supported by long, sharp-pointed, brown scales at the base of the sheaths, which are persistent, and nearly ½in. long. *cones* in clusters of three or four together, but often single, nearly horizontal, 4in. to 5in. long, 1½in. broad, tapering at both ends. Branches few, irregular, rather stout and twisted. *h.* 40ft. Mexico. Hardy in the South and West of England. (J. H. S. i. 235.)

P. monticola (mountain-top).* *l.* glaucous, triquetrous, the edges slightly scabrous, about 3in. long, the points blunt; sheaths short. *cones* 5in. to 6in. long, tapering to a sharp point. Branches whorled. *h.* 75ft. to 100ft. North California, 1831. A handsome, pyramidal-growing tree, with an erect trunk. It is closely allied to *P. Strobus*, but the leaves are shorter, and more rigid.

P. Mughus (Mughus). *l.* dark green, crowded, stiff, short, twisted, about 2in. long. *cones* usually in pairs, small, ligneous, ovoid, about 1½in. long; scales with a strong, usually curved spine. Upper branches ascending or erect; lower ones generally decumbent. *h.* 5ft. to 15ft. Mountains of Central Europe, 1779. A densely-branched tree or shrub. SYNS. *P. carpatica* and *P. Pumilio*. *P. montana*, by some botanists regarded as a distinct species, very nearly resembles *P. Mughus.*

P. M. nana (dwarf). Knee Pine. A small form, rarely above 2ft. in height.

P. muricata (prickly-coned). *l.* bright green, pliant, crowded, convex on one surface, and somewhat concave on the other, blunt, with rough edges, and short, pale sheaths, 3in. to 5in. long. *cones* clustered, about 3in. long, very dense and woody, often oblique; lower scales prominent, furnished with a sharp, woody

Pinus—*continued.*

point. Branches not numerous. *h.* 25ft. to 50ft. (rarely 80ft. to 120ft.). California, 1846. A distinct species, with a somewhat irregular growth.

P. Murrayana (Murray's). A synonym of *P. contorta Murrayana.*

P. nigra (black). A synonym of *P. austriaca.*

P. Parryana (Parry's). A synonym of *P. ponderosa.*

P. parviflora (small-flowered).* *l.* silvery on the flattened or inner sides, rigid, crowded, slightly twisted, 1in. to 1½in. long. *cones* ovate-elliptic, 2½in. to 3½in. long; scales leathery, broadly wedge-shaped. Branches approximate, horizontal or slightly ascending; branchlets numerous, short, tufted. *h.* 25ft. to 40ft. Japan, 1861. A distinct, small-growing species, having a well-furnished trunk and dense foliage. (G. C. n. s., x. 624.)

P. Pinaster (Pinaster).* Cluster Pine. *l.* dark green, stiff, broad, stout, from 6in. to 12in. long. *cones* about 4in. long, in dense clusters, yellowish-brown; scales pyramidal, angular, with a short, straight prickle; seeds winged. *h.* 60ft. to 80ft. South-west Europe, 1596. A beautiful tree, of variable habit, and succeeding best near the sea. It is, perhaps, the most uncertain of all the *Coniferæ* to remove, on account of its long, bare roots. Two-year-old seedlings seldom strike when removed, it being absolutely necessary to procure seedlings which have been transplanted when a year old, and have stood in the nursery for another year. When the seed is sown, however, where the trees are intended to stand, in deep, dry sand, they do very well. SYN. *P. maritima.* See Fig. 179. (Sy. En. B. 1381.)

P. P. Hamiltoni (Hamilton's). Lord Aberdeen's Pine. An elegant variety, with shorter and paler green leaves than the type. Nice, 1825.

P. P. variegata (variegated) more or less variegated with yellow and green.

FIG. 180. PINUS PINEA.

P. Pinea (Pine).* Parasol Pine or Stone Pine. *l.* deep green, semi-cylindrical, rather rigid, with the edges slightly scabrous, about 6in. long. *cones* from 4in. to 6in. long, and 3in. in diameter; scales stout, ligneous, hard, terminating in a recurved, obtuse prickle; seeds with a very small wing. Branches spreading; branchlets generally ascending, and confined to the top of the tree. *h.* 50ft. to 60ft. Mediterranean region, 1548. This very picturesque tree thrives best in a sandy soil, near the sea, in a sheltered situation; it is somewhat tender, not being able to stand exposure to cold blasts of wind. In Italy, the seeds, which are larger in size than those of any other European Pine, are sold as a fruit, of which the natives are uncommonly fond. See Fig. 180. (G. C. n. s., xx. 45.)

Pinus—*continued.*

P. ponderosa (heavy-wooded).* *l.* deep glaucous-green, rather rigid, three-angled, compressed, with roughish edges, from 6in. to 12in. long, sometimes twisted, confined to the extremities of the branches. *cones* ovoid, 3in. to 6in. long; scales terminating in a short spine. Branches regularly whorled, at first horizontal, afterwards decumbent. *h.* 100ft. to 150ft. and upwards. California, 1827. A very large tree, the bark of which is divided into large, flat, smooth plates, 4in. to 8in. broad. SYNS. *P. Benthamiana* (F. d. S. iv., p. 216; vi., p. 85), *P. Parryana*, and *P. Sinclairiana.*

P. p. Jeffreyi (Jeffrey's). *l.* glaucous-green, rigid, spreading, about 9in. long. *cones* large and handsome, 8in. to 9in. long, tapering, more developed above than beneath, yellowish-brown; scales closely adherent, with a projecting spine. *h.* 150ft. Oregon and California, 1852.

P. Pumilio (Pumilio). A synonym of *P. Mughus.*

FIG. 181. CONE OF PINUS PUNGENS.

P. pungens (pricking). Table Mountain Pine. *l.* in twos, 2in. to 2½in. long, pale yellowish-green, straight, rigid, thickly set on the branches. *cones* top-shaped, rather large, light yellowish-brown, 3½in. long, 2½in. broad at the base, tapering to a point, generally in whorls round the stem and top branches; scales thick, hard, broad at the base, elevated into a pyramid, with an incurved, strong, awl-shaped hook. Branches irregular and spreading; buds blunt, covered with resin. *h.* 40ft. to 50ft., resembling the Scotch Fir in habit. Mountains of Southern United States. See Fig. 181.

FIG. 182. CONE OF PINUS PYRENAICA.

P. pyrenaica (Pyrenean). *l.* thin, smooth, dense, about 4in long, the edges slightly scabrous. *cones* about 2½in. long, slightly curved, and tapering to a point. Branches numerous, with the branchlets close-set. *h.* 60ft. to 80ft. Pyrenees, 1834. A handsome species, of rapid growth, and with a regular pyramidal outline. See Fig. 182. (R. H. 1867, 16.)

P. p. brutia (Brutia). "A medium-sized tree, with spreading branches, and slender, wavy leaves, 9in. long" (Veitch). Italy. See Fig. 183.

P. radiata (rayed). A synonym of *P. insignis.*